

PATTERNS, TRENDS, AND THEMATIC FOCUS OF TEACHER SELF-EFFICACY AND INSTRUCTIONAL INNOVATION RESEARCH: A BIBLIOMETRIC APPROACH

Islawati¹, Muhammad Yunus²

^{1, 2}Universitas Negeri Makassar, Jl. A. P. Pettarani, Makassar, Sulawesi Selatan, Indonesia

Email: islawati@unm.ac.id

Article History

Received: 16-01-2026

Revision: 01-02-2026

Accepted: 04-02-2026

Published: 06-02-2026

Abstract. This study aims to map the patterns, trends, and thematic focuses of research on teachers' self-efficacy using a bibliometric approach. A bibliometric method with keyword co-occurrence analysis was employed to identify the thematic structure and research development of teachers' self-efficacy across educational levels. The data were obtained from scholarly publications indexed in Google Scholar and collected using the Publish or Perish software with the search string ("teacher self-efficacy" OR "teacher efficacy" OR "teaching self-efficacy"). The bibliographic metadata was exported in RIS format and analyzed using VOSviewer to generate density, network, and overlay visualizations. The findings indicate that teachers' self-efficacy is a central concept dominating the research landscape and functions as a key connector among multiple research themes. The thematic mapping reveals several major clusters, including beliefs and teaching practices, collective teacher efficacy and school leadership, online learning and technology, teacher well-being, and the measurement of self-efficacy. Furthermore, the temporal analysis shows that topics related to online teaching, the COVID-19 context, and teacher well-being have emerged more prominently in recent years, reflecting the evolving challenges in contemporary education. This study contributes conceptually by providing a macro-level overview of the intellectual structure and developmental trends of research on teachers' self-efficacy.

Keywords: Teacher Self-Efficacy, Teacher Efficacy, Bibliometric Analysis, Co-Occurrence, Vosviewer, Instructional Innovation

Abstrak. Penelitian ini bertujuan untuk memetakan pola, tren, dan fokus tematik penelitian mengenai *self-efficacy* guru melalui pendekatan bibliometrik. Studi ini menggunakan metode bibliometrik dengan analisis *co-occurrence* kata kunci untuk mengidentifikasi struktur tematik dan perkembangan penelitian *self-efficacy* guru dalam konteks pendidikan lintas jenjang. Data penelitian diperoleh dari publikasi ilmiah yang terindeks *Google Scholar* (2015-2025) dan dikumpulkan menggunakan perangkat lunak *Publish or Perish* dengan kata kunci ("teacher self-efficacy", "teacher efficacy", dan "teaching self-efficacy"). Metadata publikasi diekspor dalam format RIS dan dianalisis menggunakan *VOSviewer* untuk menghasilkan visualisasi peta kepadatan, peta jaringan, dan peta overlay. Hasil penelitian menunjukkan bahwa *self-efficacy* guru merupakan konsep sentral yang mendominasi lanskap penelitian dan berfungsi sebagai penghubung utama berbagai tema penelitian. Pemetaan tematik mengungkap beberapa kluster utama, meliputi keyakinan dan praktik pembelajaran, efikasi kolektif dan kepemimpinan sekolah, pembelajaran daring dan teknologi, kesejahteraan guru, serta pengukuran *self-efficacy*. Selain itu, analisis temporal menunjukkan bahwa topik-topik terkait pembelajaran daring, pandemi, dan kesejahteraan guru merupakan fokus penelitian yang berkembang dalam periode yang lebih baru. Penelitian ini memberikan kontribusi konseptual dengan menyajikan gambaran makro mengenai struktur dan arah perkembangan penelitian *self-efficacy* guru.

Keywords: *Self-Efficacy* Guru, Teacher Efficacy, Bibliometrik, *Co-Occurrence*, *Vosviewer*, Inovasi Pembelajaran

How to Cite: Islawati., & Yunus, M. (2026). Patterns, Trends, and Thematic Focus of Teacher Self-Efficacy and Instructional Innovation Research: A Bibliometric Approach. *Indo-MathEdu Intellectuals Journal*, 7 (1), 1556-1568. <http://doi.org/10.54373/imeij.v7i1.5033>

INTRODUCTION

Developments in global education over the past two decades have demonstrated a shift in the learning paradigm, requiring teachers to no longer play the conventional role of delivering material, but rather as facilitators, innovators, and agents of change in the learning process. The demands of 21st-century learning place instructional innovation as a key element in improving the quality and relevance of education across all levels. Learning innovation encompasses updates to methods, strategies, media, and the use of technology designed to enhance student engagement and learning outcomes. However, the success of instructional innovation is not solely determined by the availability of technology or curriculum policies but also depends heavily on teachers' readiness and internal confidence in implementing it. Several studies confirm that teachers are central to the success of innovative learning, as they are the ones who directly translate innovative ideas into classroom practice (Nasmal et al., 2021; Nordin, 2024). In this context, teachers' psychological well-being is a determining factor that often distinguishes between innovations that are successfully implemented and those that remain at the discourse level.

One psychological construct consistently associated with the quality of instructional practices and teachers' courage to innovate is self-efficacy. Self-efficacy reflects teachers' confidence in their ability to design, implement, and evaluate learning effectively. Teachers with high levels of self-efficacy tend to be more confident in trying new learning strategies, utilizing technology, and facing complex learning challenges. Conversely, teachers with low self-efficacy are more susceptible to resistance to change, technology anxiety, and a tendency to maintain traditional learning methods. Research examining technology-based learning transformations shows that self-efficacy acts as a motivational driver that bridges digital literacy and the successful adoption of learning innovations (Aminah et al., 2025). Thus, self-efficacy cannot be viewed simply as an individual characteristic, but as a strategic factor influencing the dynamics of instructional innovation in the education system.

Literature studies have shown that the relationship between teacher self-efficacy and instructional innovation has been studied in various contexts, ranging from technology-based learning and digital literacy to pedagogical innovation in specific subjects. Research on technology-based learning transformation confirms that teacher self-efficacy significantly contributes to the readiness and sustainability of instructional innovation (Suparyono & Paling, 2025). Another study showed that prospective teachers' self-efficacy influences their confidence in integrating new conceptual approaches into learning, such as financial numeracy, which ultimately impacts the quality of the designed learning (Fachrudin & Sandi, 2024).

Furthermore, studies on the role of teachers in innovative learning emphasize that teachers with strong professional self-confidence are better able to carry out their roles as innovators, motivators, and facilitators of learning (Nasmal et al., 2021; Nordin, 2024). These findings demonstrate that self-efficacy is a common thread connecting teacher readiness with the success of instructional innovation.

However, existing research remains fragmented and partial. Most studies focus on specific contexts, such as specific educational levels, specific subjects, or limited innovation approaches. Furthermore, the methodological approaches employed are dominated by small-scale empirical studies or conceptual studies, thus failing to provide a comprehensive picture of the development, patterns, and thematic focus of teacher self-efficacy and instructional innovation research as a whole. This situation makes it difficult for researchers and policymakers to understand the direction of research developments and identify underexplored areas. Yet, the ever-increasing accumulation of research demands studies capable of synthesizing and systematically mapping the research landscape.

In this context, a bibliometric approach becomes relevant as a strategy for mapping the intellectual structure and development dynamics of a field of study. Bibliometric analysis allows for the identification of publication patterns, research trends, and thematic relationships between concepts developing in the scientific literature. Specifically, keyword co-occurrence analysis provides insight into how the concepts of teacher self-efficacy and instructional innovation are interconnected and form specific thematic clusters. Several bibliometric studies in the field of education that you included demonstrate that this approach is effective in uncovering dominant research focuses and shifting themes over time. However, to date, the use of bibliometric co-occurrence analysis to specifically examine the relationship between teacher self-efficacy and instructional innovation across educational levels remains very limited.

The research gap in this study lies in the absence of a comprehensive mapping that integrates teacher self-efficacy and instructional innovation into a single thematic landscape based on bibliometric evidence. No study has systematically identified key theme clusters, conceptual linkages, and research development directions on this topic across educational levels. Such mapping is crucial for understanding the position of teacher self-efficacy within the discourse on learning innovation and for guiding future educational research and policy. Without a clear mapping, research tends to repeat itself on the same themes and is less responsive to practical needs in the field.

Based on these conditions, the novelty and originality of this study lies in the use of a bibliometric approach with co-occurrence analysis to map the patterns, trends, and thematic focus of research on teacher self-efficacy and instructional innovation across educational levels. By utilizing the Google Scholar database, this study covers a broad and representative spectrum of publications, so it is expected to be able to provide conceptual contributions to the development of educational research and practice. Therefore, the main objective of this study is to map the patterns, trends, and thematic focus of research on teacher self-efficacy and instructional innovation through a bibliometric approach based on co-occurrence analysis.

METHOD

This study uses a quantitative approach with bibliometric methods to map the patterns, trends, and thematic focus of research on teacher self-efficacy in the educational context. The bibliometric approach was chosen because it can provide a comprehensive overview of the development of a field of study based on the accumulation of scientific publications, and is effective in systematically identifying the thematic structure and direction of educational research development. The main focus of the analysis in this study is keyword co-occurrence analysis, which is used to reveal the conceptual linkages between themes in the study of teacher self-efficacy and instructional innovation across educational levels, as recommended in educational bibliometric studies that serve as references for this study.

Data collection was conducted using Publish or Perish software as a search tool and metadata extraction tool for scientific publications. The research data source came from Google Scholar (2025-2025) because this database has a broad scope and is able to represent the dynamics of educational research globally. The search process was carried out using the search string ("teacher self-efficacy" OR "teacher efficacy" OR "teaching self-efficacy") to capture variations in terms commonly used in the literature. The search was conducted without restrictions on educational levels to cover research across levels and across contexts. Search results were then evaluated based on the relevance of the title, abstract, and keywords to the research focus. Publications that were irrelevant, duplicative, or lacked adequate metadata were excluded from the data corpus.

The selected publication metadata was then exported from Publish or Perish in RIS format. This format was chosen because it is compatible with bibliometric analysis software and retains important information such as title, author, year of publication, source, and keywords. The RIS file was then imported into VOSviewer software for further bibliometric analysis. Using VOSviewer allows for systematic visualization of bibliometric networks and facilitates the

identification of thematic relationships between keywords in the literature. Bibliometric analysis focused on keyword co-occurrence analysis using VOSviewer. At this stage, a minimum threshold for keyword occurrences was set to ensure that only keywords with thematic significance were analyzed. Keywords with similar meanings were standardized to avoid redundancy and distortion of the thematic network. This process aimed to improve the accuracy of cluster mapping and the strength of relationships between concepts. The analysis results were visualized in the form of a network map showing thematic clusters, node sizes representing the frequency of keyword occurrence, and line thickness representing the strength of relationships between keywords.

The interpretation of the analysis results is conducted descriptively and analytically by linking the formed thematic clusters to the theoretical and empirical contexts in the reference literature you have provided. This research does not aim to test causal relationships, but rather to map the research landscape and identify thematic patterns and trends at a macro level. With clear stages ranging from data search using Publish or Perish, metadata export in RIS format, to co-occurrence analysis using VOSviewer, this research method is designed to be fully replicable by other researchers interested in studying similar topics.

RESULTS

The results of this study are presented based on a bibliometric analysis using keyword co-occurrence techniques processed with VOSviewer software. Bibliographic data were sourced from publications indexed by Google Scholar and collected through Publish or Perish using predetermined keywords. The analysis resulted in three main types of visualizations: density maps, network visualizations, and overlay maps. These three visualizations were used to illustrate the thematic structure, interconnectedness between keywords, and the temporal distribution of research on teacher self-efficacy.

Density Visualization Analysis Results

Density maps are used to show the intensity of keyword occurrences in the analyzed publication corpus. This visualization depicts areas with high, medium, and low keyword occurrence frequencies through color gradients. Keywords with high keyword densities are indicated by lighter colors, while those with lower keyword densities are indicated by darker colors.

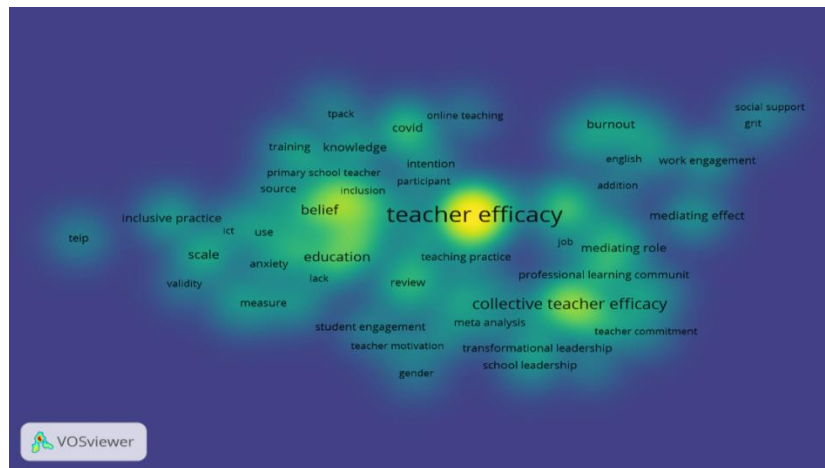


Figure 1. Density map (density visualization) keywords of teacher self-efficacy research

Based on the density map, the keyword "teacher efficacy" occupies the central position with the highest density compared to other keywords. Surrounding this keyword are several keywords that also show a relatively high density, such as "collective teacher efficacy," "belief," "education," and "teaching practice." The medium density area includes keywords such as "student engagement," "teacher motivation," "professional learning community," and "transformational leadership." Meanwhile, keywords with lower density levels are scattered around the periphery of the visualization, including "inclusive practice," "scale," "validity," "measure," "anxiety," and "gender." This density distribution indicates a strong concentration of research on the core concept of teacher self-efficacy with a distribution of supporting topics surrounding it.

Network Visualization Analysis Results

Network maps are used to depict co-occurrence relationships between keywords in the form of nodes and connecting lines. The size of the nodes indicates the frequency of keyword occurrence, while the connecting lines represent the strength of the relationship between keywords based on their co-occurrence in publications.

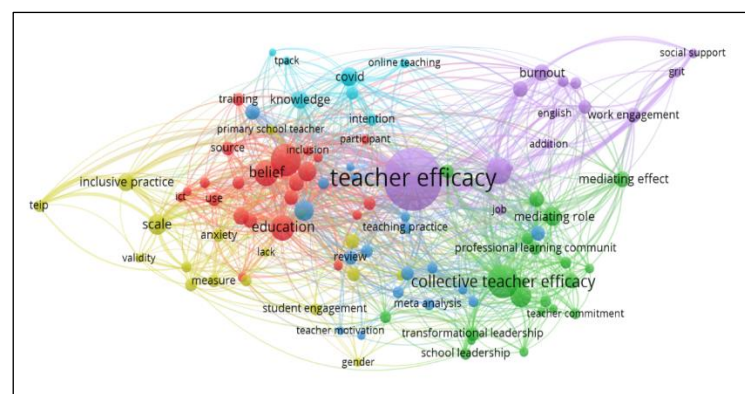


Figure 2. Network map (network visualization) keyword co-occurrence

The network visualization results show that the keyword "teacher efficacy" is the largest and most central node, with direct connections to various other keywords from various clusters. This node is strongly connected to keywords such as "collective teacher efficacy," "belief," "education," and "teaching practice." The network visualization also shows the formation of several thematic clusters distinguished by color.

The first cluster is marked in red and includes keywords such as "belief," "education," "inclusion," "ICT," "use," and "anxiety." The second cluster is green and centers on the keyword "collective teacher efficacy," with other keywords such as "teacher commitment," "professional learning community," "school leadership," and "transformational leadership." The third cluster, in blue, includes keywords such as "covid," "online teaching," "TPACK," "knowledge," "training," and "primary school teacher." The fourth cluster, in purple, includes keywords such as "burnout," "work engagement," "social support," and "grit." Furthermore, there is a yellow cluster containing measurement-related keywords, such as "scale," "measure," "validity," and "TEIP." The interconnectedness between clusters is indicated by the presence of cross-colored connecting lines, indicating that keywords from different clusters co-occur in a number of publications. The keyword "teacher efficacy" serves as the primary link between clusters, while "collective teacher efficacy" also plays a central role in connecting the leadership, work engagement, and instructional practices clusters.

Overlay Visualization Analysis Results

An overlay map is used to depict the temporal distribution of research based on the average publication year for each keyword. This visualization uses color gradients to indicate differences in time, with darker colors representing earlier publications and lighter colors indicating more recent publications.

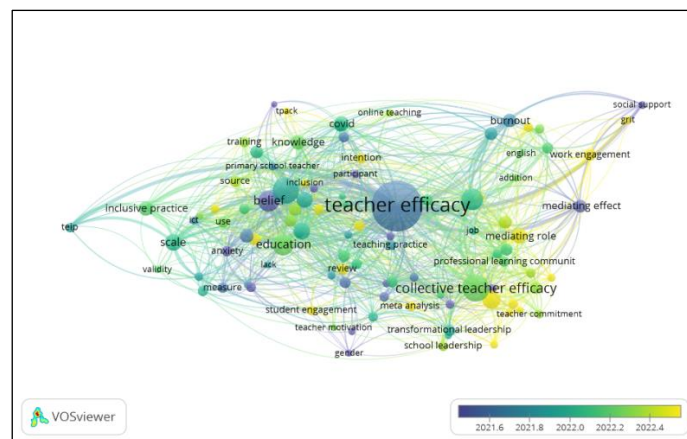


Figure 3. Overlay map (overlay visualization) keywords based on publication year

The overlay visualization results show that core keywords such as “teacher efficacy” and “belief” have relatively neutral to greenish colors, indicating their consistent occurrence throughout the analysis timeframe. Keywords related to the context of online learning and the pandemic, such as “covid” and “online teaching,” are displayed in lighter colors, indicating their more recent occurrence. Similarly, keywords such as “burnout,” “work engagement,” and “mediating effect” tend to have lighter colors than measurement keywords such as “scale” and “validity,” which show darker colors. This color distribution illustrates the temporal variation in the topic’s occurrence in teacher self-efficacy research.

DISCUSSION

The findings of this study indicate that teacher self-efficacy is a central concept dominating the educational research landscape, as reflected in the position of the keyword "teacher efficacy," which is at the center of the network, has the highest density, and is widely connected to various thematic clusters. This central position indicates that teacher self-efficacy has become a conceptual axis that integrates various educational issues, from learning practices and school leadership to teachers' psychosocial well-being. This finding aligns with studies that confirm that teachers' beliefs in their own abilities play a crucial role in determining the quality of learning and the success of instructional innovations (Nasmal et al., 2021; Nordin, 2024). In this context, self-efficacy does not stand as an isolated construct, but rather as a psychological foundation that underpins various teacher professional practices.

The strong link between "teacher efficacy" and "belief" emerging in the main cluster confirms that the personal belief dimension is central to the study of teacher self-efficacy. This demonstrates consistency between the bibliometric map and the empirical literature, which places teacher beliefs as a determining factor in pedagogical decision-making, classroom management, and the courage to implement innovative learning approaches. Studies on the role of teachers in innovative learning confirm that teachers with strong professional beliefs tend to be more adaptive to change and more able to manage classroom dynamics effectively (Nasmal et al., 2021). Thus, these bibliometric findings reinforce the argument that developing teacher self-efficacy is a crucial prerequisite for learning transformation.

The cluster linking teacher self-efficacy to education and teaching practice demonstrates that research focuses not only on internal psychological aspects but also on the practical implications of self-efficacy in real-life learning contexts. This relationship confirms that teacher self-efficacy has direct relevance to classroom teaching practices, including strategy selection, media use, and management of learning interactions. This aligns with study findings

showing that teachers with high self-efficacy are better able to integrate new learning approaches and adapt them to student needs (Suparyono & Paling, 2025). In other words, self-efficacy serves as a bridge between teachers' personal capacity and the implementation of instructional innovations.

Another significant finding is the emergence of a "collective teacher efficacy" cluster, closely linked to keywords such as "professional learning community," "school leadership," and "transformational leadership." This cluster demonstrates a shift in research focus from individual self-efficacy to collective and contextual dimensions. This indicates that research increasingly recognizes the importance of the social and organizational environment of schools in shaping collective teacher beliefs. Studies on school leadership and professional learning communities indicate that collective support, collaboration among teachers, and transformational leadership contribute to strengthening teachers' collective efficacy and professional commitment (Nordian, 2024). Thus, these findings confirm that the development of teacher self-efficacy cannot be separated from the organizational context and school culture.

The correlation between "collective teacher efficacy" and "teacher commitment" within the same cluster indicates that teachers' collective beliefs are closely related to their level of professional commitment. This reinforces the view that when teachers feel collectively supported and have shared confidence in their team's abilities, they tend to demonstrate a higher level of commitment to their professional duties and school goals. This finding is relevant to studies highlighting the importance of teacher preparedness and resilience in facing educational challenges, particularly amidst change and disruption (Aminah et al., 2025). Thus, collective self-efficacy can be viewed as a psychosocial resource that strengthens the sustainability of learning innovations.

Clusters related to "COVID," "online teaching," and "TPACK" reflect research responses to the drastic changes in learning practices caused by the pandemic. The link between teacher self-efficacy and online learning suggests that teachers' beliefs in their abilities play a crucial role in adapting to technology-based learning. Studies on technology-based learning transformation confirm that digital literacy and positive perceptions of technology interact with teacher self-efficacy in determining the success of online learning implementation (Suparyono & Paling, 2025). These bibliometric findings demonstrate that the pandemic context has broadened the focus of self-efficacy research into the realm of technology and digital learning.

Furthermore, the interconnectedness of "training" and "knowledge" within the same cluster indicates that teacher competency development is an integral issue in the study of self-efficacy. This aligns with literature emphasizing the importance of training and knowledge

enhancement as primary sources of teacher self-efficacy improvement. Research on the self-efficacy of prospective teachers indicates that prior knowledge and specific conceptual understanding significantly influence teachers' confidence in implementing new learning approaches (Fachrudin & Sandi, 2024). Thus, these findings reinforce the argument that teacher professional development interventions need to be systematically designed to enhance self-efficacy.

Another prominent cluster links self-efficacy to burnout, work engagement, social support, and grit. The emergence of this cluster demonstrates the increasing focus of research on the dimensions of teacher well-being and the psychosocial factors that influence sustained professional performance. The relationship between self-efficacy and burnout suggests that teachers' confidence in their abilities is potentially linked to resilience to work pressure and professional burnout. This finding aligns with studies highlighting the importance of social support and work engagement in maintaining teachers' psychological health (Aminah et al., 2025). Thus, self-efficacy can be understood not only as a driver of performance but also as a protective factor in the context of teacher well-being.

The presence of clusters focused on measurement aspects, such as "scale," "measure," "validity," and "TEIP," indicates that the development and validation of teacher self-efficacy instruments remains a key research concern. This indicates ongoing efforts to ensure the reliability and validity of self-efficacy measurements in various educational contexts. This focus on methodological aspects supports the consistency and accuracy of future research and allows for cross-study comparisons. These findings are relevant to research emphasizing the importance of valid instruments in assessing teacher self-efficacy and its implications for instructional practice (Fachrudin & Sandi, 2024). The temporal distribution shown by the overlay map reveals that certain topics, such as online learning, burnout, and mediation effects, tend to emerge in more recent periods. This reflects research responses to the challenges and dynamics of contemporary education. Meanwhile, core topics such as teacher self-efficacy and beliefs show consistent emergence over time, indicating the stability and continued relevance of these constructs. This pattern indicates that teacher self-efficacy research is evolving dynamically, maintaining a focus on core concepts while responding to emerging issues.

Theoretically, the findings of this study contribute to the understanding of teacher self-efficacy as an integrative construct in educational studies. Bibliometric mapping shows that self-efficacy serves as a connecting node between psychological, pedagogical, organizational, and technological dimensions. This contribution enriches theoretical discourse by providing a macro picture of how various research themes interact and develop. Practically, these findings

have implications for the development of policies and programs to improve teacher quality, emphasizing the importance of strengthening self-efficacy at both the individual and collective levels.

Practical implications of these findings include the need to design teacher professional development programs that focus not only on improving technical competency but also on strengthening self-efficacy and fostering collective support. Training programs integrated with professional learning communities and supportive school leadership have the potential to strengthen teacher self-efficacy and encourage sustainable instructional innovation (Nordian, 2024; Suparyono & Paling, 2025). Furthermore, attention to teacher well-being and burnout prevention is crucial for maintaining sustainable professional performance and learning quality.

Despite its significant contribution, this study has several limitations. First, the bibliometric analysis relies on available publication metadata, so the quality of the results is largely determined by the completeness and consistency of the data. Second, the use of a single database may limit the scope of publications analyzed. Third, the co-occurrence analysis does not allow for causal inferences regarding relationships between concepts. These limitations open up opportunities for future research to combine bibliometric approaches with more in-depth empirical studies or meta-analyses.

Overall, this discussion confirms that teacher self-efficacy is a key construct that continues to evolve and adapt to the dynamics of education. The bibliometric mapping conducted in this study provides a comprehensive overview of research patterns, trends, and thematic focuses, and reveals the important contribution of self-efficacy to instructional innovation, educational leadership, and teacher well-being. These findings provide a strong conceptual foundation for further research and educational practice oriented toward strengthening the role of teachers as agents of change.

CONCLUSION

Teacher self-efficacy is a central construct that dominates the educational research landscape and serves as a connecting axis for various important themes. The position of the keyword "teacher efficacy," which is at the center of the network and has the highest density, indicates that this concept is a primary focus and continues to develop in academic discourse. These findings confirm that teacher self-efficacy is understood not only as an individual belief but also as a psychological foundation that influences teaching practices, educational leadership, and teacher well-being.

Thematic mapping shows that teacher self-efficacy research is developing within several main clusters, including the beliefs and learning practices cluster, the collective efficacy and school leadership cluster, the online learning and technology cluster, the teacher well-being cluster, and the measurement and methodology cluster. The existence of the "collective teacher efficacy" cluster, which is connected to transformational leadership and professional learning communities, indicates a shift in research focus toward the collective and contextual dimensions of teacher self-efficacy. Furthermore, the emergence of clusters related to online learning, the pandemic, and technology indicates a research response to the dynamics of contemporary education (Suparyono & Paling, 2025). These findings demonstrate that teacher self-efficacy research is dynamic and adaptive to changes in the educational context.

Conceptually, this study contributes by presenting a macro overview of the structure and direction of teacher self-efficacy research development. The bibliometric mapping conducted enriches theoretical understanding of self-efficacy's position as an integrative construct linking psychological, pedagogical, organizational, and technological dimensions in education. Practically, these findings underscore the importance of strengthening teacher self-efficacy, both at the individual and collective levels, as a key strategy in encouraging instructional innovation and sustainable learning quality (Aminah et al., 2025).

RECOMMENDATIONS

It is recommended to develop more in-depth empirical studies to test the relationships between the themes identified in the bibliometric map. Researchers can also combine bibliometric approaches with meta-analyses or longitudinal studies to gain a more comprehensive understanding of the impact of teacher self-efficacy on teaching practices and student learning outcomes. Furthermore, expanding data sources and exploring more diverse educational contexts can enrich the findings and increase the generalizability of the research results. Thus, future research is expected to strengthen scientific contributions and provide more applicable recommendations for the development of educational policies and practices.

ACKNOWLEDGMENTS

The author would like to thank all parties who have provided support and contributions to the completion of this research. Appreciation is expressed to colleagues and academic colleagues for their input, discussions, and constructive suggestions during the research preparation process. The author also acknowledges the availability of scientific publications indexed in Google Scholar as the primary data source in the bibliometric analysis in this study.

Furthermore, the author expresses gratitude for the use of Publish or Perish and VOSviewer software, which greatly assisted in the data collection process and visualization of the bibliometric analysis. The author acknowledges that any shortcomings in this research are entirely his responsibility.

REFERENCES

- Aminah. (2023). *Membaca Masa Depan Pendidikan: Kesiapan Guru Indonesia di Tengah Disrupsi*. Jakarta: Penerbit Nasional Pendidikan.
- Fachrudin, A. D., & Sandi, W. M. (2024). Analisis Self-efficacy Calon Guru Matematika terhadap Penggunaan Financial Numeracy sebagai Dimensi Konseptual dalam Pembelajaran Matematika. *Jurnal Edukasi*, 10(1), 62–70.
- Junaidah. (2025). Peran Guru dalam Pengelolaan Kelas Perspektif Teori Pendidikan Modern. *JIP (Jurnal Ilmiah Ilmu Pendidikan)*, 8(2), 1613–1618.
- Meriyenti. (2023). Model Guided Inquiry Learning pada Pembelajaran Kimia Menggunakan VOSviewer: Analisis Bibliometric. *INNOVATIVE: Journal of Social Science Research*, 3(4), 45–60.
- Nasmal, H., et al. (2020). Studi Bibliometrik: Analisis Tren Media Digital pada Pembelajaran Kimia SMA Saat dan Setelah COVID-19. *Jurnal Pendidikan Kimia*, 9(2), 101–115.
- Nasmal, H., Nurhasanah, E., & Tasia, F. E. (2021). Peran Guru dalam Pelaksanaan Pembelajaran Inovatif. *Aufklarung: Jurnal Pendidikan, Sosial dan Humaniora*, 1(2), 130–136.
- Nordian. (2024). Transformasi Peran Guru dalam Pembelajaran Inovatif di Era Pendidikan Modern. *Jurnal Pendidikan dan Pembelajaran*, 15(1), 45–56.
- Purnomo, Putri Amelia. (2023). Analisis Bibliometrik Keterampilan Berpikir Kritis dalam Pembelajaran Biologi Melalui STEM pada Tinjauan Publikasi 2013–2023. *Jurnal Pendidikan Sains*, 11(3), 215–228.
- Rambe, Aprilia. (2025). Kesiapan Digital dalam Transformasi Pendidikan: Hubungan Digital Literacy Competencies dan E-Learning Attitudes Guru di Jawa Barat. *Jurnal Empati*, 14(5), 22–37.
- Sitorus, Anis Faras. (2024). Studi Bibliometrik: Analisis Tren Media Digital pada Pembelajaran Kimia SMA Saat dan Setelah COVID-19. *Journal of Research and Education Chemistry (JREC)*, 7(4), 503–517.
- Suparyono, S., & Paling, A. R. (2025). Transformasi Pembelajaran Berbasis Teknologi: Literasi Digital, Self-efficacy, dan Persepsi Teknologi sebagai Kunci Utama. *Jurnal Inovasi Pendidikan*, 12(1), 1–15.