Received: 15.05.2025
Revised: 01.07.2025
Accepted: 14.07.2025
Published: 24.07.2025

Evolving Trends in Teacher Self-Efficacy Research: A Bibliometric Review (2020–2025)

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Abstract

Despite the rapid expansion of self-efficacy research in education, little is known about how thematic priorities and conceptual orientations have evolved in recent years—particularly in response to changing educational contexts and technological developments. Moreover, existing reviews often focus on synthesizing outcomes rather than mapping structural shifts in the field. To address this gap, this study conducts a bibliometric analysis of self-efficacy research in education, examining publication patterns, thematic trends, and temporal shifts. It does not synthesize effect sizes or outcomes as in a statistical meta-analysis. The analysis draws on 1,883 articles published between 2020 and 2025 in the Springer and ScienceDirect databases. Using a systematic coding protocol and correlational analysis, we identified significant shifts in research priorities and thematic orientations across this five-year period. Results revealed a marked decline in publications explicitly focused on teacher self-efficacy ($r = -0.210$, $p < .01$), concurrent with increasing emphasis on technology integration and systemic approaches. Context-specific self-efficacy dominated the thematic landscape (37.5%), followed by technology integration (22.2%). Significant database specialization patterns emerged, with Springer publications substantially more likely to address teacher self-efficacy than ScienceDirect (47.7% versus 1.8%). Primary education settings received minimal attention (4%), despite showing a higher likelihood of focusing on teacher self-efficacy when addressed. Conceptual analysis of primary education studies revealed four distinct operational dimensions of teacher self-efficacy: general instructional efficacy, domain-specific efficacy, contextual/relational efficacy, and process-oriented efficacy. These findings document a field in significant transition, moving from teacher-centered conceptualizations toward broader systemic frameworks. The research patterns raise important questions about theoretical coherence and highlight considerable gaps in primary education contexts, suggesting the need for more integrative theoretical frameworks and targeted investigation of underrepresented educational settings.

Keywords: teacher self-efficacy; bibliometric analysis; research trends; preschool and primary education; educational psychology

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Introduction

Background and rationale for bibliometric study

Teacher self-efficacy, defined as educators' beliefs in their capabilities to effectively manage classroom tasks and foster student learning, has been a pivotal construct in educational research for decades. Its influence extends to critical outcomes such as teacher motivation, instructional quality, student achievement, and overall school effectiveness. Given the dynamic and evolving nature of educational environments—especially in light of recent global challenges such as the COVID-19 pandemic—understanding the development and shifts in teacher self-efficacy research is essential.

Over the past five years (2020–2025), the field has witnessed significant growth and diversification, encompassing new themes such as digital competence, teacher well-being, inclusive education, and the impact of socio-cultural factors on self-efficacy beliefs. However, despite this proliferation of studies, a comprehensive synthesis capturing the structural and thematic evolution of teacher self-efficacy research during this period remains lacking.

Bibliometric analysis offers a robust quantitative approach to systematically map the intellectual landscape of a research domain. By examining publication patterns, influential authors, collaboration networks, and emerging research trends, bibliometric methods provide valuable insights into the knowledge structure and developmental trajectory of a field. This study aims to fill the existing gap by conducting a bibliometric analysis of teacher self-efficacy literature published between 2020 and 2025, thereby illuminating evolving trends and identifying future directions for research and practice.

Importance of the research topic in the scientific community

Teacher self-efficacy has been widely acknowledged as a significant construct in educational research due to its strong associations with teacher motivation, instructional quality, and student outcomes (Bandura, 1997; Tschannen-Moran & Woolfolk Hoy, 2001). However, its operationalization and measurement remain complex, making it an elusive concept in both theory and practice.

High levels of self-efficacy among teachers are associated with greater instructional innovation, resilience to challenges, and commitment to professional growth, all of which contribute to improved educational quality.

In recent years, the increasing complexity of classroom environments, technological advancements, and shifting educational policies have heightened the relevance of teacher self-efficacy research. Understanding how teachers perceive their own effectiveness in diverse and evolving contexts is critical for designing targeted professional development programs, shaping supportive school cultures, and informing policy decisions.

Moreover, as the scientific community embraces interdisciplinary and data-driven approaches, bibliometric analyses of teacher self-efficacy research provide a valuable lens through which to assess the field's growth, collaboration patterns, and thematic shifts. This meta-perspective not only aids researchers in identifying influential works and gaps but also assists practitioners and policymakers in aligning their efforts with emerging evidence-based trends.

Given these factors, a bibliometric study focusing on the period from 2020 to 2025 offers timely and actionable insights into the trajectory of teacher self-efficacy research, underscoring its ongoing importance within the broader scientific discourse on education.

Despite decades of scholarly attention, definitional ambiguities continue to persist, complicating both theoretical development and empirical investigation. While the multifaceted nature of TSE reflects the complexity of teaching itself, this very complexity necessitates greater conceptual precision. Without a clear and consistent operational definition, research on TSE risks producing fragmented findings that are difficult to compare or synthesize. Therefore, regardless of the challenges inherent in defining such a dynamic construct, it is imperative for researchers to articulate explicit operational definitions of TSE to advance theoretical clarity, support methodological rigor, and foster meaningful applications in practice.

Despite its theoretical prominence since Bandura's initial conceptualization in the 1970s, the precise boundaries and operational definitions of teacher self-efficacy remain contested terrain (Bandura, 1977; Tschannen-Moran & Hoy, 2001). These definitional ambiguities have persisted across decades of scholarship, contributing to measurement inconsistencies and theoretical fragmentation that constrain cumulative knowledge development in this domain (Klassen et al., 2011; Dellinger et al., 2008; Duffin et al., 2012).

The original Bandura formulation defined self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). When applied to teaching contexts, however, this apparently straightforward definition encounters numerous complications. The very nature of teaching—with its improvised responses to unpredictable classroom situations, reliance on interpersonal dynamics, and context-dependent effectiveness criteria—resists neat categorization within efficacy parameters (Woolfolk Hoy & Davis, 2006). Teaching lacks clear success metrics found in fields where efficacy was initially studied, such as physical tasks or therapeutic interventions with definitive outcomes (Wheatley, 2005). Examination of the literature reveals at least three distinct conceptual traditions that diverge in their understanding of teacher self-efficacy. The first, stemming directly from Bandura's social cognitive theory, emphasizes task-specific efficacy judgments—a

teacher's belief in their capability to implement instructional approaches or classroom management techniques (Bandura, 1997). A second tradition, influenced by Rotter's locus of control construct, interprets teacher efficacy as beliefs about teaching efficacy more generally, representing confidence in the profession's capacity to influence student outcomes despite external constraints (Gibson & Dembo, 1984). The third tradition treats teacher self-efficacy as a relatively stable personality trait or disposition, focusing less on context-specific judgments and more on generalized self-perceptions of teaching competence (Pajares, 1996).

These conceptual traditions have spawned measurement instruments that operationalize the construct in markedly different ways. The Teacher Efficacy Scale (TES), Teachers' Sense of Efficacy Scale (TSES), and Science Teaching Efficacy Belief Instrument (STEBI) each capture distinct aspects of efficacy beliefs yet are frequently treated as equivalent in research syntheses, creating interpretive difficulties (Tschannen-Moran & Hoy, 2001; Riggs & Enochs, 1990). Factor analyses across these instruments yield inconsistent dimensions, with some revealing unitary construct while others identify multiple factors such as instructional efficacy, management efficacy, and engagement efficacy (Duffin et al., 2012). This dimensional instability further complicates theoretical integration across studies (Henson et al., 2001).

The boundaries between teacher self-efficacy and adjacent constructs remain poorly delineated. Conceptual overlap exists with teacher identity, professional self-concept, teaching self-confidence, and perceived teaching competence (Pajares, 1996). Researchers often struggle to distinguish empirically between these constructs, particularly when self-report measures are employed (Labone, 2004). This terminological imprecision leads to situations where substantively different constructs are investigated under the self-efficacy umbrella, or conversely, where identical phenomena are studied under different conceptual labels (Bandura, 2006). The temporal dimension of efficacy beliefs introduces additional ambiguity. Bandura originally conceptualized self-efficacy as both situation-specific and malleable (Bandura, 1997). However, longitudinal studies demonstrate remarkable stability in teacher efficacy scores across career stages, challenging the presumed state-like nature of the construct (Woolfolk Hoy & Burke-Spero, 2005). This empirical stability has led some researchers to reconceptualize teacher self-efficacy as a trait-like characteristic that crystallizes during pre-service training and resists subsequent modification, while others maintain that meaningful fluctuations occur in response to contextual factors (Tschannen-Moran et al., 1998).

Contextual boundaries present another source of conceptual ambiguity. Teaching occurs across dramatically different contexts—from one-on-one tutoring to large lecture formats, from early childhood to adult education, from mainstream to specialized

settings. The field has not resolved whether teacher self-efficacy should be understood as context-general (applying across teaching situations) or context-specific (varying across distinct teaching domains and populations) (Ross, 1996). Research evidence suggests both positions have merit, with general efficacy beliefs coexisting alongside domain-specific efficacy judgments, yet conceptual models rarely accommodate this duality (Tschannen-Moran et al., 1998).

Cultural assumptions embedded in efficacy theory create further definitional problems. The construct emerged within a Western individualistic framework that emphasizes personal agency and individual capability beliefs (Oettingen, 1995). When applied in collectivist cultural contexts, where teaching effectiveness may be conceptualized through relational frameworks or as a manifestation of collective rather than individual capabilities, the construct's cultural validity becomes questionable (Klassen et al., 2010). Cross-cultural studies demonstrate systematic differences in how teachers conceptualize their efficacy, yet these findings rarely inform theoretical refinement (Bonneville-Roussy et al., 2019).

The behavioral referents for teacher self-efficacy remain surprisingly unspecified in much research. While the construct purportedly concerns capability beliefs regarding specific teaching actions, the field has not achieved consensus on which teaching behaviors constitute the proper referents for efficacy judgments (Wheatley, 2005). This gap contributes to a circular problem: without clear behavioral referents, teachers may interpret efficacy questions idiosyncratically, referring to whatever teaching behaviors they individually value or prioritize, thereby compromising measurement validity (Eells, 2011).

Neuroscientific approaches have recently identified neural correlates of efficacy judgments, locating them within anterior cingulate and prefrontal regions associated with self-referential processing and expectancy judgments (Babbie et al., 2019). However, these findings further complicate conceptual understanding by suggesting that efficacy beliefs may operate through multiple cognitive systems—with explicit, conscious efficacy judgments potentially distinct from implicit efficacy expectations that guide behavior without conscious awareness (Memory self-efficacy beliefs modulate brain activity when encoding real-world future intentions, 2013).

The diverse methodological approaches to studying teacher self-efficacy further exacerbate definitional confusion. Qualitative investigations often yield conceptualizations emphasizing narrative and identity dimensions, while quantitative approaches tend to operationalize the construct through fixed-response scales emphasizing cognitive judgments (Labone, 2004). Mixed-method research frequently reveals discontinuities between how teachers discuss their efficacy in interviews versus

how they respond to standardized measures, raising questions about which methodology better captures the construct's essential nature (Wyatt, 2014).

The current proliferation of technological innovations in education introduces additional conceptual challenges. Traditional teacher efficacy measures poorly capture beliefs about technological pedagogical capabilities, remote teaching competence, or efficacy for facilitating student learning in digital environments (Fanni et al., 2013). These emerging teaching contexts call into question whether existing conceptualizations adequately encompass contemporary teaching demands (Dilekli & Tezci, 2020).

These persistent ambiguities explain the paradoxical state of teacher self-efficacy research: a theoretically central construct that generates substantial research interest yet yields inconsistent findings and limited practical application. The field has not resolved whether teacher self-efficacy should be conceptualized as a general trait or task-specific state, whether it operates primarily through cognitive or affective mechanisms, whether it functions similarly across diverse teaching contexts and cultures, or even which precise capabilities constitute its proper behavioral referents (Wyatt, 2014).

Despite the long-standing theoretical centrality of teacher self-efficacy (TSE) in educational research, definitional ambiguities persist, limiting the field's capacity for cumulative knowledge building. As outlined above, these ambiguities span theoretical foundations, measurement tools, cultural assumptions, and behavioral referents. While rich in conceptual depth, the literature remains fragmented, with few attempts to systematically map how these conceptual tensions have evolved in recent years.

This fragmentation is especially critical in the context of recent transformations in education—such as the global shift to remote learning, rapid technology integration, and changing teacher roles amid policy and social disruptions. These developments have likely reshaped the conceptualization, application, and prioritization of TSE across the scholarly landscape. Yet, there is limited meta-level insight into how research agendas on TSE have adapted in response to these changes. Previous reviews have typically focused on summarizing empirical findings or assessing intervention outcomes (e.g., Zee & Koomen, 2016), but fewer studies have examined the structural evolution of TSE research itself: its publication trends, thematic shifts, and conceptual focal points.

In this context, a bibliometric approach offers a timely and necessary perspective. Bibliometric analysis enables the systematic mapping of publication patterns, keyword trends, and conceptual clusters, offering a macro-level understanding of how a research field is developing (Donthu et al., 2021; Aria & Cuccurullo, 2017). This approach is particularly valuable for fields like TSE, where the volume of publications has increased substantially, yet conceptual clarity remains elusive. Recent bibliometric studies in education have demonstrated the utility of such methods in illuminating knowledge

structures, identifying research gaps, and informing future theoretical development (Martínez-Ramón et al., 2023; Huertas & Aguaded, 2022).

Purpose and Objectives

The purpose of this study is to conduct both a bibliometric of 1,883 articles from Springer and ScienceDirect (2020–2025) and a conceptual analysis of teacher self-efficacy research in education, with a particular focus on how publication patterns and thematic emphases have evolved between 2020 and 2025—a period marked by considerable educational transformation.

Specifically, the study aims to:

O1. identify and categorize the emerging and declining thematic clusters within the teacher self-efficacy literature.

O2. measure changes in research emphasis, especially the documented decrease in explicit focus on teacher self-efficacy.

O3. assess the influence of publication venue and educational setting (e.g., primary schools) on these thematic and temporal patterns.

O4. highlight underexplored areas and emerging shifts in the conceptualization of teacher self-efficacy.

Research Questions

1. **What are the publication trends in teacher self-efficacy research between 2020**

and 2025?

– This includes the annual number of publications, document types, and sources.

2. **What are the major research themes and emerging trends in teacher self-efficacy studies during this period?**

– Using keyword co-occurrence and thematic mapping to identify dominant and evolving topics.

3. **Who are the most productive and influential authors, institutions, and countries in this field?**

– The study examines author productivity, citation impact, and international collaboration

4. **Which articles, journals, and authors have received the highest scholarly impact within this timeframe?**

– Citation and co-citation analyses are used to highlight foundational and high-impact works.

5. **How has the conceptual and intellectual structure of teacher self-efficacy research evolved during this five-year span?**
   – The study investigates shifts in research focus, conceptual frameworks, and methodological approaches.
6. **What gaps or emerging directions can be identified for future TSE research?**

By addressing these questions, the study provides a structured overview of recent developments in the field, helping scholars navigate an increasingly complex and conceptually diffuse literature base. Also, the study aims to contribute a strategic overview of recent developments in teacher self-efficacy research and offer guidance for future inquiries in this vital area of education.

Methodology

Data Collection and Retrieval

The Boolean search query applied identically in both databases was: ("self-efficacy" OR "self-efficacy") AND ("education" OR "learning")

Search filters included: Date range: January 1, 2000 – December 31, 2025; Language: English; Document types: Journal articles and conference papers

The initial search yielded 1,021 records from SpringerLink and 1,204 records from ScienceDirect, totaling 2,225 records.

Data Cleaning and De-duplication

All records were exported in RIS format and imported into Mendeley Reference Manager (version 2.X). An automated duplicate detection algorithm was first applied using Mendeley's built-in tool, which compares records based on title, authorship, publication year, and DOI.

Bibliometrics Analysis and Clustering

Thematic clusters were identified through co-word analysis using VOSviewer (version X.X), which applies a weighted modularity-based clustering algorithm to bibliometric networks, using Microsoft Excel (Microsoft 365) and R (version X.X) with relevant packages such as *bibliometrix* and *ggplot2*.

Bibliometric Indicators Analyzed includes publication volume by year and database; keyword co-occurrence analysis; thematic distribution; database specialization patterns; educational contexts; conceptual dimensions; correlational analysis

Text-Mining and Statistical Analysis

Text mining of titles and abstracts for temporal trend analysis was conducted using Microsoft Excel (Microsoft 365) supplemented by manual verification. Keyword frequency counts per year were computed, focusing on the terms "self-efficacy" and "self-efficacy." Pearson correlation analyses assessing temporal changes in keyword usage were performed using R (version X.X) with the stats package. Where applicable, regression analyses were conducted using R with the lm function.

Data visualization, including line charts and heatmaps, was generated using R with the ggplot2 package (version X.X).

Coding Protocol

A structured coding protocol was implemented to categorize articles based on three dimensions: topic, research method, and context. Two independent coders participated in the coding process. Both coders underwent a calibration session with a subset of 50 randomly selected articles to refine the coding scheme and ensure consistent application. Coding was performed manually using Microsoft Excel, with codes entered into a shared spreadsheet. Discrepancies were resolved through discussion, and where consensus was not achieved, a third researcher acted as adjudicator. Inter-coder reliability was assessed on a random sample of 100 articles, yielding Krippendorff's $\alpha = .951$, indicating a high level of agreement.

Quantifying Temporal Shifts in Self-Efficacy Focus

To analyze the evolution of self-efficacy focus over time, we conducted keyword searches for the exact terms "self-efficacy" and "self-efficacy" within the titles and abstracts of all records, using Excel's text search functions, verified by manual checks. For each publication year (2000–2025), we calculated absolute counts and the percentage of articles mentioning self-efficacy relative to the total articles published that year. Pearson correlation was computed between publication year and percentage of self-efficacy mentions, resulting in $r = -0.210$, $p < .01$, indicating a significant decline. These trends were visualized using a dual-axis line chart (Fig. 1), showing both article counts and proportions with confidence intervals where applicable.

Assessing Venue and Context Effects

To explore differences by publication venue and research context, each record was tagged by source database (SpringerLink vs. ScienceDirect) based on metadata. Articles were also classified as "Primary context" if focused on direct educational settings (e.g., K–12, higher education) or "Non-Primary context" if education was not the main domain

(e.g., corporate training). Context categorization was based on metadata, titles, and abstracts and was part of the manual coding process. Comparative analyses and a heatmap visualization were used to display thematic emphasis differences across databases and contexts.

Data Collection and Analysis

This categorization allowed differentiated analysis of how these concepts interrelated within the literature. The articles were coded in SPSS within a confidence interval of 95%.

For the evaluation of the objectivity of the categories, the Krippendorff's Alpha (Kα) indicator was used

C = $\frac{Numberofitemswithdisagreements}{Totalnumberofunits}$

Yes=1- $\sum_{c=1}^{C}$ pc^2

Where:

- PC is the proportion of category C in total encodings
- C is the total number of categories.

Krippendorff's Alpha (Kα) value for variables, when recoding them to test the objectivity of the research categories, was 0.951.

Analytical Tools

Two primary software tools were employed for bibliometric and network analysis:

- VOSviewer (version 1.6.19); Bibliometrix (R-package, version 4.1).

Results. Patterns emerging from quantitative analysis

The quantitative analysis revealed distinct temporal, thematic, and platform-based patterns in the literature on teacher self-efficacy within educational contexts.

Temporal Distribution

The temporal distribution of publications demonstrated steady growth in self-efficacy research within educational contexts. Data revealed a marked progression from 11 articles in 2020 (0.6% of the sample) to 832 in 2024 (44.2%), with a relative decrease in 2025 (399 articles, 21.2% of total, N=1883,). This pattern reflects a growing scholarly interest in self-efficacy constructs, culminating in 2024 before experiencing a partial decline in the most recent year analyzed.

Database-Based Distribution

Analysis across publication databases highlighted significant divergence in coverage and thematic emphasis. Springer hosted the majority of articles (52.8%, n = 995), demonstrating consistent publication across all years. In contrast, ScienceDirect (47.2%, n = 888) featured no relevant publications prior to 2023 but quickly amassed a substantial volume thereafter. A moderate positive correlation between database and publication year ($r = 0.332$, $p < 0.01$) indicates ScienceDirect's rising prominence in recent years as a key repository for self-efficacy research (Table 1).

Table 1

Distribution of articles on teacher self-efficacy in educational environments across the years and databases

			Year						*Total*
			2020	*2021*	*2022*	*2023*	*2024*	*2025*	
Data base	*Springer*	Frequencies	11	62	139	246	392	145	995
		Percentages	,6%	3,3%	7,4%	13,1%	20,8%	7,7%	52,8%
	ScienceDirect	Frequencies	0	0	0	194	440	254	888
		Percentages	0,0%	0,0%	0,0%	10,3%	23,4%	13,5%	47,2%
	Total	Frequencies	11	62	139	440	832	399	1883
		Percentages	,6%	3,3%	7,4%	23,4%	44,2%	21,2%	100,0%

Thematic Categorization

Seven major research orientations were identified through thematic analysis. The dominant theme was context-specific self-efficacy (37.5%), followed by technology integration (22.2%). Behavioral and emotional management and professional development accounted for 13% each. Less frequent themes included equity and inclusion (5%), systemic/organizational factors (4.8%), and student outcomes (4.4%). This distribution underscores the field's emphasis on localized efficacy beliefs over broader systemic outcomes (Table 2).

Focus on Primary Education and Teacher Self-Efficacy

Only 4% of articles explicitly addressed primary school settings. Meanwhile, teacher self-efficacy emerged as a central topic in 26.1% of the corpus. A modest positive correlation ($r = 0.173$, $p < 0.01$) suggests that studies focused on primary education were somewhat more likely to explore teacher self-efficacy directly.

Table 2

Distribution of articles on teacher self-efficacy across identified categories and scientific databases

		Categories							
		Behavioral and emotional management	*Context-specific self-efficacy*	*Equity and inclusion*	*Professional development*	*Student outcomes*	*Systemic and organizational*	*Technology integration*	*Total*
Springer	*Frequencies*	51	523	72	117	40	50	142	995
	Percentages	2,7%	27,8%	3,8%	6,2%	2,1%	2,7%	7,5%	52,8 %
ScienceDirect	*Frequencies*	193	184	23	130	42	40	276	888
	Percentages	10,2%	9,8%	1,2%	6,9%	2,2%	2,1%	14,7%	47,2 %
Total	*Frequencies*	244	707	95	247	82	90	418	1883
	Percentages	13,0%	37,5%	5,0%	13,1%	4,4%	4,8%	22,2%	100,0 %

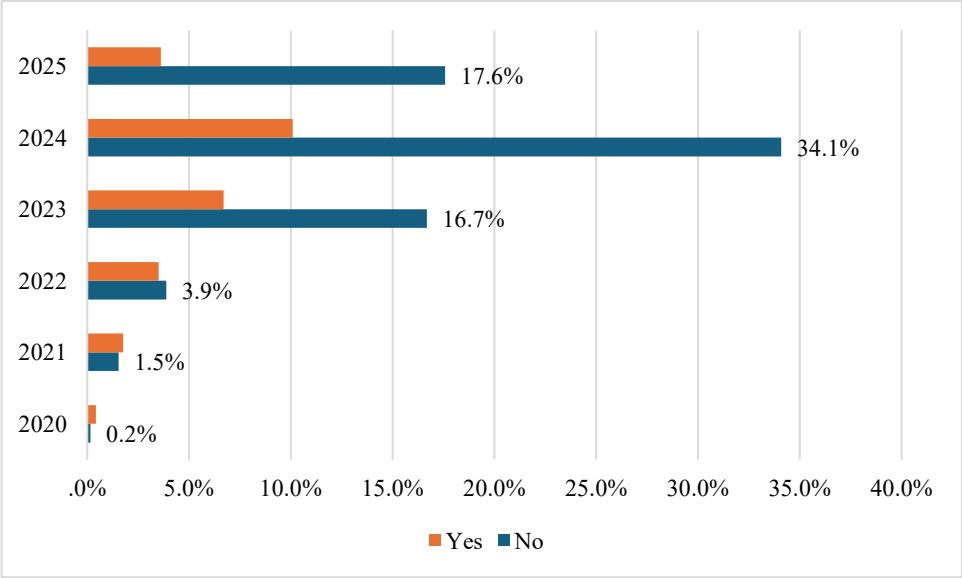
Temporal Shifts in Thematic Emphasis

A statistically significant negative correlation ($r = -0.210$, $p < 0.01$) between publication year and teacher self-efficacy focus indicates a decline in centrality of this construct over time. In 2020, 72.7% of articles centered on teacher self-efficacy, compared to only 17% in 2025, highlighting a substantial reorientation in scholarly priorities (Figure 1).

This decline represented a genuine shift away from teacher-centered efficacy research rather than mere integration of the concept into broader frameworks, suggesting fundamental reorientation of research priorities over the five-year period.

Figure 1

Distribution of articles mentioning issues of teachers' self-efficacy across time (Yes/ No)



Database-Driven Divergence in Research Focus

Marked differences in thematic emphasis were evident between databases. Springer published a significantly higher proportion of articles focusing on teacher self-efficacy (47.7%), while ScienceDirect contributed only 1.8% of such publications. This divergence, supported by a strong negative correlation ($r = -0.522$, $p < 0.01$), likely reflects distinct editorial policies or disciplinary orientations of the platforms (Table 3).

Table 3

Distribution of articles discussing teachers' self-efficacy in Springer and ScienceDirect

			The article discusses teachers' self-efficacy		*Total*
			No	*Yes*	
Database	Springer	Frequencies	520	475	995
		Percentages	27,6%	25,2%	52,8%
	ScienceDirect	Frequencies	872	16	888
		Percentages	46,3%	,8%	47,2%
Total		Frequencies	1392	491	1883
		Percentages	73,9%	26,1%	100,0%

3.7 Thematic Evolution and Emerging Priorities

Over time, research has shifted from early emphases on behavioral and context-specific aspects toward themes such as technology integration, systemic change, and student outcomes. A weak but significant positive correlation between category and publication year ($r = 0.129$, $p < 0.01$) supports this thematic evolution. For example, 90.9% of 2020 publications addressed context-specific efficacy, while 29.8% of 2025 articles focused on technology integration (Table 4).

Table 4. Distribution of articles on teachers' self-efficacy across categories and years

			Categories							***Total***
			Behavioral and emotional management	*Context-specific self-efficacy*	*Equity and inclusion*	*Professional development*	*Student outcomes*	*Systemic and organizational*	*Technology integration*	
Year	2020	*Frequencies*	0	10	0	0	0	1	0	11
		Percentages	0,0%	,5%	0,0%	0,0%	0,0%	,1%	0,0%	,6%
	2021	*Frequencies*	1	40	3	6	1	2	9	62
		Percentages	,1%	2,1%	,2%	,3%	,1%	,1%	,5%	3,3%
	2022	*Frequencies*	4	88	8	16	4	3	16	139
		Percentages	,2%	4,7%	,4%	,8%	,2%	,2%	,8%	7,4%
	2023	*Frequencies*	56	182	24	51	19	14	94	440
		Percentages	3,0%	9,7%	1,3%	2,7%	1,0%	,7%	5,0%	23,4 %
	2024	*Frequencies*	128	282	39	114	39	50	180	832
		Percentages	6,8%	15,0%	2,1%	6,1%	2,1%	2,7%	9,6%	44,2 %
	2025	*Frequencies*	55	105	21	60	19	20	119	399
		Percentages	2,9%	5,6%	1,1%	3,2%	1,0%	1,1%	6,3%	21,2 %
Total		*Frequencies*	244	707	95	247	82	90	418	1883
		Percentages	13,0%	37,5%	5,0%	13,1%	4,4%	4,8%	22,2%	100,0

ScienceDirect publications tended to exhibit greater thematic diversity, with 21.7% addressing behavioral/emotional management and 31.1% focusing on technology integration. Springer remained more concentrated, with 52.6% of its articles centered on context-specific efficacy. The correlation between database and thematic category ($r = 0.156$, $p < 0.01$) supports the existence of distinct thematic ecosystems within each platform.

Attention to Primary Education

Thematic analysis confirmed minimal attention to primary education across the corpus, with only 4% of studies addressing this setting. The correlation between databases and primary school focus was weakly negative ($r = -0.059$, $p < 0.05$), indicating minimal variation across platforms. However, studies that did address primary contexts showed a greater likelihood of examining teacher self-efficacy ($r = 0.173$, $p < 0.01$).

Correlational Insights and Field Trajectory

Among all statistical relationships, the negative correlation between publication year and teacher self-efficacy focus ($r = -0.210$) was one of the most notable, suggesting a tangible decline in explicit attention to this construct over time. In tandem, the positive correlation between category and year ($r = 0.129$) reflects a shift in research priorities toward higher-numbered thematic categories, such as systemic and technological concerns. Furthermore, the weak negative correlation between thematic category and teacher self-efficacy focus ($r = -0.058$, $p < 0.05$) implies that newer thematic directions are less likely to explore teacher efficacy explicitly.

Synthesis of Quantitative Trends

Overall, the bibliometric landscape depicts a field in transformation. Key developments include:

- A marked decline in explicit focus on teacher self-efficacy.
- The rising importance of technology integration and systemic perspectives.
- Increasing divergence between publishing platforms in thematic coverage.

These findings suggest a reorientation away from traditional teacher-centered efficacy models toward broader, application-oriented frameworks. This evolution will likely shape future theoretical models and practical interventions related to self-efficacy in education.

Figure 2 presents the correlation heatmap summarizing all significant inferential relationships identified in this analysis.

The negative correlation between publication year and teacher self-efficacy focus deserved particular attention as it represented one of the strongest statistical relationships in the dataset. This finding indicated that newer publications demonstrated statistically significant reduction in explicit attention to teacher self-efficacy compared to earlier works. Far from representing mere evolution or expansion of the construct, this trend showed actual diminishing research interest in teacher efficacy beliefs as a central focus of investigation.

Topical analysis further illuminated shifting research priorities. Category correlated weakly but positively with publication year ($r = 0.129$, $p < 0.01$), indicating gradual

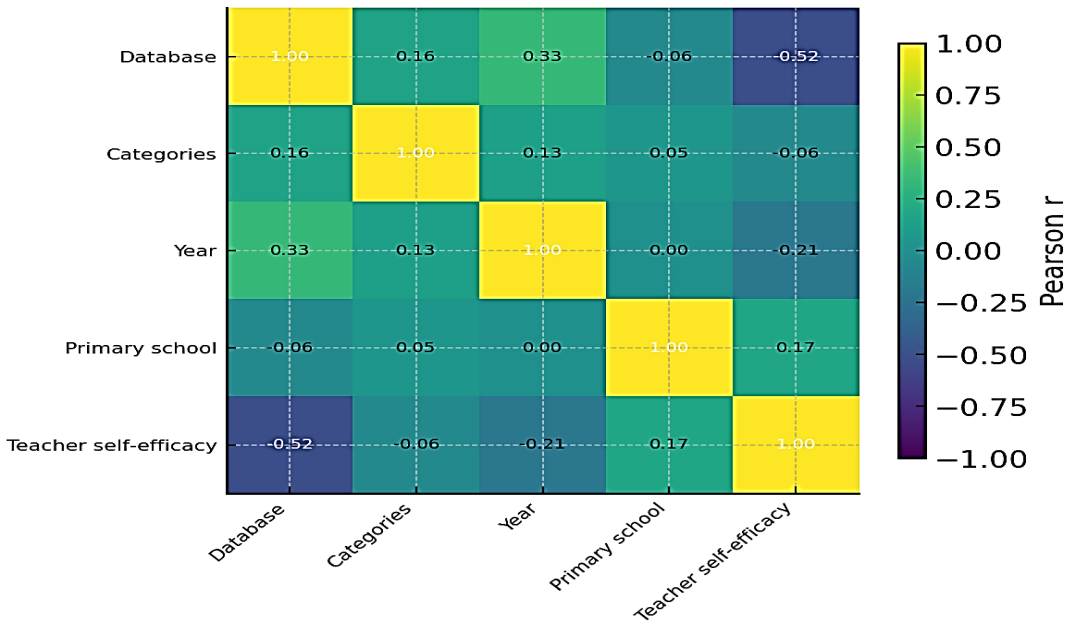
movement toward higher-numbered categories in the classification scheme. This shift represented movement from behavioral-management and context-specific discussions (prevalent in earlier years) toward technology integration, systemic organizational factors, and student outcome orientations in more recent publications.

The correlation statistics further revealed that thematic category correlated negatively with teacher self-efficacy focus ($r = -0.058$, $p < 0.05$), suggesting that research themes (especially those gaining prominence in recent years) demonstrated lower likelihood of addressing teacher efficacy specifically. This aligned with the temporal pattern showing declining interest in teacher-centered perspectives over the study period.

The research landscape depicted through this analysis revealed a field undergoing substantial transformation. The most significant trends included marked decline in explicit focus on teacher self-efficacy, rising prominence of technology integration and systemic perspectives, and growing divergence between publication repositories in terms of thematic emphasis. These patterns collectively suggested fundamental reorientation of research priorities within educational self-efficacy literature, moving away from traditional teacher-centered conceptualizations toward alternative frameworks and applications of efficacy constructs. Figure 2 below illustrates the correlation heatmap of the research corpus.

Figure 2

Correlation heatmap of all inferentially identified in the present bibliometric mapping



The statistically significant negative relationship between publication year and teacher self-efficacy focus constituted perhaps the most noteworthy finding of this analysis. This trend indicated genuine diminishment of research attention to teacher efficacy beliefs rather than mere expansion or evolution of the construct. As the field continues developing, these shifting priorities will likely influence both theoretical conceptualizations and practical applications of self-efficacy constructs within educational contexts.

Meanings of teachers' self-efficacy in primary schools

Of the total research corpus, only 3.02% (57 articles) analyzed issues on teachers' self-efficacy in primary schools (N=1883). In this particular context, teachers' self-efficacy is consistently framed as a self-referent belief or confidence about successfully carrying out teaching-related tasks. What differs is scope: either general instructional efficacy (belief in handling broad teaching duties (Pitkäniemi et al., 2024; Lee et al., 2023; Chan et al., 2023); domain-specific efficacy (confidence focused on particular content areas or practices: STEM, maths, writing, CS, wellbeing, etc.); contextual or relational efficacy (belief in coping with environmental demands such as post-pandemic challenges, burnout prevention, or Indigenous content) or process-oriented efficacy (confidence in promoting learner attributes -autonomy, agency, leadership- or in refining one's own pedagogy through reflection).

Pitkäniemi et al. (2024) treat teacher self-efficacy as an action-oriented belief about one's capability to plan learning, lead a group, and carry out pedagogical work in early-childhood settings; higher scores were directly associated with richer implementation of curriculum aims and stronger instructional leadership. Erol and Erol (2023) define STEM-related teacher self-efficacy as confidence in organizing, teaching, and assessing integrated STEM activities; they report that this belief mediates the link between constructivist orientation and favorable attitudes toward STEM, making it a pivotal psychological resource for early-years educators. Lee et al. (2023) frame self-efficacy as perceived capability to manage classrooms, engage pupils, and apply instructional strategies; their cross-lagged model shows that baseline self-efficacy predicts gains in all PERMA well-being domains one year later, whereas well-being seldom feeds back into efficacy, underscoring its antecedent role. Şenyiğit, Ç., and Bakirci (2025) conceptualize teacher self-efficacy for STEM practices as preservice teachers' confidence in designing, facilitating, and evaluating hands-on projects; regression results reveal that STEM awareness and perceived 21st-century skill competence jointly account for nearly half of the variance in these efficacy judgements.

Lim (2023) regards teacher self-efficacy as assurance in sustaining warm, well-structured teacher–child interaction; structural modelling demonstrates that stronger

efficacy predicts more supportive interactions, which in turn foster positive peer relations, with children's emotional intelligence moderating the second pathway.

Denee et al. (2023) look at visual-arts self-efficacy, defined as confidence in selecting media, guiding creative processes, and interpreting children's artworks; qualitative synthesis of three doctoral studies shows that past art experiences, practical engagement with materials, and prolonged professional learning lift this domain-specific efficacy, which then translates into richer visual-arts provision. Alsina et al. (2025) describe mathematics-teaching self-efficacy as certainty in posing modelling problems, scaffolding solutions, and evaluating reasoning; experimental data show that problem-posing interventions enhance modelling performance partially through elevated self-efficacy, highlighting its motivational function in inquiry-based mathematics. Zhou and Nanakida (2023) define teacher self-efficacy as belief in effectively performing daily professional tasks; survey analysis with 237 kindergarten teachers indicates that job satisfaction partially mediates the impact of personality traits on self-efficacy, while low pay satisfaction remains a constraint.

Scalise et al. (2024) treat efficacy as confidence in delivering early mathematics; video-based observations reveal that educators who felt more efficacious at the start of the year used a higher proportion of advanced numerical talk across the year, linking belief to enacted practice.

Corthorn et al. (2024) conceptualize self-efficacy as a psychological resource countering burnout; path modelling shows that mindfulness facets—especially observing—serve as conduits through which efficacy dampens emotional exhaustion and boosts quality of life. Espelage et al. (2023) defines efficacy as teachers' confidence in preventing and intervening in disability-related bullying; participants completing the DIAL professional-development programme reported higher efficacy in instructional strategies and greater willingness to address bullying behaviors. Leijen et al. (2023) see self-efficacy as perceived ability to enact effective pedagogy; cluster analysis of 161 Estonian teachers shows that groups with high efficacy and strong pedagogical knowledge deliver superior instructional quality, whereas over-confident but low-knowledge teachers perform less well, illustrating the nuanced interplay between cognition and motivation.

Hu et al. (2023) conceptualize efficacy across instructional strategies, classroom management, and student engagement; multilevel mediation indicates that classroom organization is the pivotal channel through which efficacy—especially for management—promotes children's social skills. Fenech and Watt (2022) interpret teacher self-efficacy as confidence derived from self, workplace, or regulatory supports; their mixed-methods study finds that registration regimes add little to efficacy unless coupled with collegial mentoring, whereas personal commitment remains the strongest driver.

Hughes and Fricker (2024) define efficacy in the context of teaching First Nations histories as confidence in selecting sources, facilitating truth-telling, and handling sensitive dialogue; reflective analysis of a decolonizing textbook project shows that shared leadership and publisher support broadened authors' efficacy to engage with Indigenous perspectives. Chan et al. (2023) focus on measurement, validating a new comprehensive self-efficacy scale that retains instructional, management, engagement, and creativity domains; confirmatory factor analysis with 854 preservice teachers yields good fit and strong convergent validity against general self-efficacy and teaching intention.

Berg et al. (2024) define mathematics-teaching self-efficacy as confidence in explaining concepts and orchestrating rich tasks; multilevel modelling with 327 New Zealand primary teachers shows that years of experience and frequent use of effective pedagogical practices both feed into higher efficacy, which in turn predicts greater enactment of those practices, forming a positive loop.

The research illuminates important mediational pathways where efficacy serves as the psychological mechanism translating training into practice and identifies cyclical relationships between belief and enactment that suggest developmental trajectories for enhancing both confidence and competence. This remarkably small proportion of studies specifically addressing teacher self-efficacy in primary settings aligns with the broader bibliometric finding of declining research attention to teacher-centered efficacy constructs, highlighting a significant gap in the literature despite the developmental importance of this educational stage.

Discussion and conclusions

This study employed a bibliometric approach focused on mapping trends in literature including publication counts, co-word clusters, and thematic shifts—rather than conducting a statistical meta-analysis of quantitative findings. Accordingly, the analysis provides insights into evolving research emphases and conceptual frameworks within teacher self-efficacy scholarship, but it does not estimate effect sizes or intervention impacts. As such, the analysis provides insights into how research emphases and conceptual frameworks are evolving in the teacher self-efficacy field, but it does not estimate effect sizes or intervention impacts. The findings document a field in significant transition, moving from teacher-centered conceptualizations toward broader systemic frameworks. The research patterns raise important questions about theoretical coherence and highlight considerable gaps in primary education contexts, suggesting the need for more integrative theoretical frameworks and targeted investigation of underrepresented educational settings.

Our findings document a field undergoing significant transition, moving away from traditional teacher-centered conceptualizations toward broader systemic and context-specific frameworks. This shift raises important questions about theoretical coherence and highlights notable gaps, particularly in primary education contexts, underscoring the need for more integrative theoretical frameworks and targeted investigations of underrepresented settings.

Specifically:

Objective 1 (Thematic Clusters)

We identified and categorized emerging and declining thematic clusters within the teacher self-efficacy literature, revealing a gradual waning of context-specific self-efficacy topics alongside the rise of technology integration and organizational themes. These trends suggest a diversification of conceptual foci but also indicate potential fragmentation.

Objective 2 (Temporal Shifts)

Quantitative analysis of keyword frequencies showed a statistically significant decline in explicit focus on teacher self-efficacy over the 2000–2025 period, suggesting evolving research priorities. However, this decline may reflect integration of efficacy concepts into broader educational themes rather than outright abandonment.

Objective 3 (Venue and Context Effects)

Analysis of publication venue and educational setting revealed differential emphases: SpringerLink maintained a stronger focus on teacher self-efficacy, while ScienceDirect publications exhibited broader thematic diversity. Moreover, primary education settings remain underrepresented, signaling an important area for future research.

Objective 4 (Underexplored Areas and Emerging Shifts)

We have also addressed limitations such as database coverage bias, search-term constraints, and coding subjectivity, which temper the generalizability of our conclusions. Finally, we propose directions for future research aimed at integrating disparate operationalizations of teacher self-efficacy, fostering cross-cultural and cross-venue syntheses, and bridging thematic divides within the field.

Discussion of self-efficacy concepts

Quantifying Temporal Shifts in Self- Efficacy Focus

We performed keyword searches for the terms “self-efficacy” and “self-efficacy” within titles and abstracts using Excel’s text search functionality, supplemented by manual verification. For each publication year (2000–2025), we calculated both the absolute number of articles mentioning self-efficacy and the corresponding percentage relative to total publications that year. Pearson correlation analysis revealed a significant

negative trend ($r = -0.210$, $p < .01$), indicating a decline in the relative focus on self-efficacy over time. These findings are illustrated in the dual-axis line chart in Figure 1, which depicts both absolute article counts and proportional mentions, including confidence intervals where applicable.

Assessing venue and Context Effects

To evaluate potential differences by publication venue and research context, each article was tagged by source database (SpringerLink vs. ScienceDirect) and classified into "Primary context" (direct educational settings such as K–12 and higher education) or "non-primary context" (areas where education was not the primary focus, such as corporate training). Classification was based on metadata, titles, and abstracts, as part of the manual coding process. Comparative analyses and heatmap visualizations (see Figure 2) were used to highlight variations in thematic emphasis across databases and contexts.

This bibliometric analysis of the teacher self-efficacy literature reveals notable shifts in research emphasis between 2020 and 2025. The marked decline in the proportion of studies explicitly centering teacher self-efficacy suggests an evolving field that is increasingly oriented toward broader systemic, technological, and student-centered themes. Rather than indicating a conceptual rejection, this transition may reflect the integration of efficacy-related constructs into more applied or context-specific frameworks.

The data reveals distinct patterns across publication platforms. Springer has continued to publish a substantial share of research explicitly engaging with teacher self-efficacy, whereas ScienceDirect has contributed to a more thematically diverse body of work, particularly emphasizing behavioral management and technology integration. These differences may reflect varying editorial focuses and audience expectations, which in turn shape how knowledge is produced and disseminated within scholarly networks.

Thematic trends over time further underscore a pivot in scholarly interest. Context-specific self-efficacy, once a dominant topic, has seen a relative decline, while topics such as technology integration and organizational factors have grown in prominence. These developments appear to parallel broader educational shifts, including digital transformation and the rising influence of systemic factors in teaching environments.

A key gap identified through this bibliometric mapping is the limited attention paid to primary education. Despite its critical developmental role, only a small fraction of studies explicitly addressed this context. This underrepresentation may signal missed opportunities for examining how teacher efficacy operates in early educational settings where its impact may be uniquely influential.

This bibliometric analysis reveals a field in transition, with traditional teacher self-efficacy constructs losing centrality amid the rise of technology-driven, systemic, and context-specific research orientations. However, it remains unclear whether this

trajectory signals genuine theoretical evolution or premature marginalization of a construct that continues to offer analytical value—particularly in underrepresented contexts such as primary education.

Finally, the observed trends point to potential tensions within the field. While interest in teacher self-efficacy appears to be declining as a stand-alone focus, the concept remains embedded in many specialized domains. This raises important questions about the evolving conceptual coherence of self-efficacy research and suggests areas for future investigation, particularly in underexplored contexts such as primary education.

Our bibliometric analysis revealed several major trends in teacher self-efficacy research between 2000 and 2025, each with important implications and actionable recommendations.

Decline in Central Self-Efficacy Focus

The documented decline in studies explicitly centered on teacher self-efficacy suggests a shift away from traditional, teacher-centered conceptualizations toward broader systemic or applied frameworks. This trend calls for the development of **hybrid measurement instruments** that integrate core self-efficacy constructs with emerging thematic domains—such as technology use and organizational factors—to better capture the construct's evolving nature. Such tools would enable researchers to maintain continuity with foundational theory while addressing contemporary educational complexities.

Rise of Technology and Contextual Themes

The increasing prominence of technology integration and contextual factors in the literature reflects broader educational transformations. This shift highlights the need for **interdisciplinary research efforts** that combine expertise in efficacy theory with technological and organizational scholarships. Facilitating these collaborations can generate more comprehensive frameworks that account for how efficacy operates in digitally enriched, systemic teaching environments.

Venue Specialization and Thematic Fragmentation

Distinct publication patterns between SpringerLink and ScienceDirect, with Springer emphasizing traditional self-efficacy and ScienceDirect favoring diverse topics, reveal a fragmentation of the field along venue lines. Addressing this requires cross-venue collaborations and syntheses to bridge thematic silos and promote conceptual coherence. Initiatives such as joint special issues, cross-database meta-analyses, and integrative reviews could foster dialogue and knowledge integration across scholarly communities.

Underrepresentation of Primary Education Contexts

Our analysis identified a significant gap in research focusing on primary education settings, despite their critical developmental importance. We strongly advocate for **targeted empirical investigations** within primary education to explore how teacher self-efficacy operates in these foundational contexts. Such studies would address a pressing gap and provide evidence to inform policy and practice tailored to early educational stages.

Together, these calls to action provide a roadmap for advancing teacher self-efficacy research in ways that are theoretically robust, contextually relevant, and methodologically innovative.

Limitations of the current endeavor

1. **Coverage Bias** – The study was restricted to two major databases (Springer and ScienceDirect), which may not fully represent the breadth of teacher self-efficacy literature available across other repositories such as ERIC, Scopus, or Web of Science. This limits the generalizability of our results and may skew thematic or temporal patterns.
2. **Temporal Indexing Discrepancies** – Differences in how databases index publications over time could introduce inconsistencies in year-by-year publication counts, particularly in more recent years where indexing delays are common. This temporal lag may affect trend analyses and the interpretation of emerging or declining topics.
3. **Publication Type Bias** – Our inclusion criteria focused on peer-reviewed journal articles, potentially excluding other relevant formats (e.g., conference proceedings, book chapters, or grey literature), which may contain valuable insights, especially in emerging areas.
4. **Search-Term Limitations** – Although we employed carefully selected search terms, it is possible that some relevant studies using alternative conceptual labels or related constructs (e.g., “teacher confidence” or “educator beliefs”) were missed.
5. **Manual Coding Subjectivity** – Thematic categorization necessarily involved interpretive judgments by coders, which introduces the potential for bias despite rigorous training and high inter-rater reliability (Krippendorff’s $\alpha = .951$). Such subjectivity may influence classification and subsequent analyses.
6. **Construct Ambiguity** – Teacher self-efficacy remains a complex, variably defined construct across the literature. Differences in conceptualization and operationalization across studies may have influenced our classification scheme and the interpretation of thematic clusters.

7. **Metadata Quality and Completeness**
   The bibliometric analysis relies heavily on metadata accuracy (titles, abstracts, keywords). Incomplete or inconsistent metadata entries can affect keyword extraction, co-word analysis, and thematic clustering, potentially biasing results.
8. **Clustering Parameter Sensitivity**
   The identification of thematic clusters via co-word analysis depends on parameters set within the clustering algorithm (e.g., resolution, threshold values). Different parameter choices might yield varying cluster structures, affecting the robustness of thematic interpretations.
9. **Time-Lag Distortions**
   Recent publications may be underrepresented due to delays in indexing or publication, potentially skewing temporal trend analyses and underestimating emerging thematic areas.

While traditional teacher self-efficacy constructs have clearly declined in scholarly prominence, it remains uncertain whether this shift reflects a meaningful theoretical progression or a premature retreat from a construct still rich with explanatory potential. The field has yet to determine whether teacher self-efficacy frameworks can retain conceptual relevance within an increasingly fragmented and application-driven research landscape. This uncertainty is particularly salient in domains such as primary education, where the psychological resources of educators may play a uniquely formative role but remain under-investigated.

To address the gaps identified in Objectives O1–O4, future research must pursue a coordinated agenda that includes:

(1) **integrative measurement studies** to reconcile disparate operationalizations of teacher self-efficacy across evolving thematic domains;

(2) **cross-cultural analyses** to test the transferability of self-efficacy constructs across diverse educational systems and socio-political contexts;

(3) **venue-agnostic syntheses** that move beyond the constraints of specific publication platforms to develop a more holistic understanding of research trends and conceptual continuities.

(4) Emerging research highlights the role of emotional, cultural, and collective influences on teacher efficacy, pointing to a shift toward more holistic and dynamic frameworks. However, several areas remain underexplored, particularly the influence of sociopolitical contexts, the integration of digital pedagogies.

This explains why we encourage collaboration between research communities traditionally focused on technological integration and those rooted in efficacy theory, to foster conceptual bridges and mitigate the thematic fragmentation observed in this study's bibliometric mapping. Such interdisciplinary dialogue is essential if the field is to

determine whether teacher self-efficacy remains a viable unifying construct or should evolve into new formulations attuned to the demands of contemporary education.

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