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Governing Rural and Remote Teacher Workforces: A Bibliometric Analysis of Distribution, Recruitment, and Retention Research

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Abstract: Rural and remote school systems face persistent difficulty distributing and retaining qualified teachers, yet the knowledge base remains dispersed across education policy, labor-market, and organizational research. This study maps the development, social structure, conceptual organization, and intellectual foundations of rural and remote teacher-workforce research and interprets their implications for public-service workforce governance. The systematically screened corpus comprised 478 Scopus-indexed articles and reviews published between 1957 and 2026 and retrieved on 4 August 2026. Performance analysis and thematic evolution were conducted with bibliometrix/Biblioshiny, while network mapping used VOSviewer 1.6.21. Publication output accelerated after 2019, which accounted for 70.3% of the corpus, but international co-authorship remained limited at 10.67%. The final author-keyword map contained 38 terms in six clusters, while title-abstract analysis retained 43 terms in five clusters. Both converged on distribution, shortages, recruitment, turnover, attrition, incentives, leadership, professional development, and equity. The recurrent co-authorship network was small, whereas co-citation analysis revealed a shared intellectual base centered on organizational and labor-market explanations of workforce instability. The thematic shift from recruitment toward distribution and from equity toward retention indicates that rural staffing is increasingly understood as a connected governance cycle. The study proposes an integrated framework linking workforce intelligence, preparation, allocation, workplace support, mobility, and retention, with equity as a cross-cutting outcome.

Keywords: Bibliometric Analysis; Remote Schools; Rural Teachers; Teacher Distribution; Teacher Retention.

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1. Introduction

The unequal distribution of qualified teachers remains one of the most persistent administrative challenges in rural and remote education systems. Geographic isolation, small and dispersed populations, difficult transport, limited housing and infrastructure, and restricted professional opportunities can make vacancies hard to fill and placements difficult to sustain. Yet these conditions do not operate independently of government action. Staffing outcomes are also shaped by the accuracy of workforce data, the design and implementation of allocation rules, the reliability of incentives, the preparation of candidates for rural service, and the organizational support available after appointment (Darling-Hammond & Sykes, 2003; Monk, 2007; Özoğlu, 2015). For public administration, the central issue is therefore broader than a numerical teacher shortage. Teachers are geographically distributed public-service personnel whose recruitment, deployment, support, movement, and retention depend on coordinated administrative functions. A system may produce enough teachers in aggregate while remote schools continue to experience long vacancies, subject mismatch, repeated turnover, or a concentration of inexperienced personnel. Such patterns demonstrate that

workforce supply, spatial allocation, and organizational continuity must be governed as an interconnected cycle rather than as separate policy events.

Previous research has generated important explanations for different stages of this cycle. Labor-market and organizational studies have examined teacher sorting, turnover, and the conditions under which schools lose personnel (Hanushek et al., 2004; Ingersoll & Tran, 2023). Rural education research has emphasized recruitment, community context, preparation, and the distinctive demands of remote service (Biddle & Azano, 2016; Monk, 2007; Tran et al., 2020). Other studies have connected retention to school leadership, job satisfaction, administrative support, resilience, and professional development (Castro et al., 2010; Grissom, 2011; Opoku et al., 2020; Tran et al., 2023). This knowledge is substantial but dispersed across education policy, labor economics, teacher education, organizational studies, and rural development.

The fragmentation creates both an analytical and a policy problem. When recruitment, distribution, incentives, leadership, mobility, attrition, and equity are examined in separate literatures, it becomes difficult to identify how the field has evolved, which concepts form its thematic center, whose work structures collaboration, and which references constitute its shared intellectual base. Conventional narrative reviews can explain selected findings, but they do not by themselves reveal the large-scale social, conceptual, and citation structures of a research domain. Bibliometric performance analysis and science mapping are suited to this task because they combine publication and citation indicators with relational evidence from co-authorship, keyword co-occurrence, bibliographic coupling, document citation, and co-citation networks (Aria & Cuccurullo, 2017; Donthu et al., 2021; van Eck & Waltman, 2010).

This study maps the development of rural and remote teacher-workforce research and interprets the resulting structure from a public-administration perspective. It contributes in three ways. First, it consolidates a systematically screened corpus covering 1957-2026 and documents the field's growth, influence, and geographic concentration. Second, it triangulates author-designated keywords with terms extracted from titles and abstracts, reducing reliance on a single representation of conceptual structure. Third, it integrates the mapped themes into a governance framework linking workforce intelligence, preparation, spatial allocation, workplace support, mobility, and retention, with equity as a cross-cutting outcome. Accordingly, the study addresses four research questions aligned with the available bibliometric evidence.

Table 1. Research questions and analytical alignment

Research question	Operational focus	Primary evidence
RQ1	How have publication output, citation influence, and geographic participation developed?	Biblioshiny performance indicators and trend statistics
RQ2	How is the field socially and geographically organized?	Author collaboration and country-level publication/collaboration indicators
RQ3	What conceptual themes structure the field, and how have they evolved?	Author-keyword, title-abstract, trend-topic, and thematic-evolution analyses
RQ4	What intellectual foundations and current research fronts inform a public-administration interpretation of rural teacher staffing?	Document citation, cited-reference co-citation, source coupling, and integrated interpretation

2. Literature

Rural and remote staffing as a workforce-distribution problem

Rurality is not a single administrative condition. It may involve distance from service centers, low population density, archipelagic dispersion, weak transport and digital connectivity, limited amenities, or labor markets that offer few opportunities for accompanying family members. These conditions influence who applies, which placements are accepted, how long teachers remain, and whether experienced teachers accumulate in more advantaged locations. Biddle and Azano (2016) show that the rural school problem has been repeatedly constructed through changing social and policy concerns, while Monk (2007) identifies recruitment and retention as enduring constraints on the availability of high-quality teachers in rural areas.

Distribution policy mediates between aggregate supply and local access. Allocation rules, appointment systems, transfer practices, and career ladders can reproduce spatial imbalance even when national teacher numbers appear adequate. Özoğlu (2015), for example, demonstrates how allocation arrangements can produce an unequal regional distribution of novice and senior teachers. From an equity perspective, the relevant outcome is therefore not only the number of teachers employed, but the stability, qualifications, subject fit, and continuity of the workforce available to geographically disadvantaged students.

Recruitment, preparation, and retention across the employment cycle

Recruitment and retention are analytically connected. Recruitment determines the size and composition of the applicant pool and influences whether candidates understand the conditions of rural service before accepting a position. Preparation shapes professional readiness, expectations, and coping capacity. Tran et al. (2020) argue for realistic job previews that incorporate the perspectives of rural educators, while Ronfeldt (2012) links characteristics of teacher-preparation placements to subsequent retention and effectiveness. These studies suggest that durable staffing begins before formal deployment.

Retention is then produced through the interaction of individual, organizational, and place-based conditions. Early-career teachers may enter challenging settings with strong intentions yet leave when professional isolation, workload, weak induction, or limited career progression accumulate (Castro et al., 2010; Clandinin et al., 2015). In rural Ghana, Opoku et al. (2020) identify contextual conditions that enhance retention, illustrating why policy transfer must account for institutional and community differences. Attrition and turnover are thus not merely personal choices; they are administrative outcomes influenced by how public organizations structure work and support employees.

Incentives, leadership, and organizational support

Financial incentives are a prominent response to hard-to-staff locations because they can compensate for hardship, travel cost, and forgone opportunities. Their influence, however, depends on implementation reliability and on the non-financial conditions surrounding a placement. Delayed or opaque payments can undermine trust, while compensation alone cannot resolve weak housing, professional isolation, limited instructional resources, or restricted career mobility. A governance perspective therefore treats incentives as one component of a broader support package rather than as an autonomous intervention.

School leadership and administrative support are especially important because they translate system-level policy into everyday working conditions. Grissom (2011) connects principal effectiveness to satisfaction and turnover in disadvantaged schools, and Tran et al. (2023) show that the relative importance of administrative supports varies across school types. Organizational analyses similarly demonstrate that instability can be generated by workplace conditions and management practices, not only by an insufficient supply of qualified candidates (Hanushek et al., 2004; Ingersoll & Tran, 2023).

Need for an integrated bibliometric perspective

The literature therefore contains a recognizable set of connected concerns, but their development and relationships have not been sufficiently integrated at field level. A bibliometric approach can reveal whether the domain is organized primarily around shortages, allocation, organizational conditions, or equity; whether collaboration crosses national boundaries; and whether recent themes depart from the intellectual foundations represented in cited-reference networks. Combining performance analysis with science mapping is particularly useful for a multidisciplinary field in which influence, collaboration, and conceptual structure cannot be inferred from publication counts alone (Donthu et al., 2021).

This study uses that integrated perspective to treat rural and remote teacher staffing as a public-service workforce governance system. The literature is interpreted through a provisional cycle comprising demand and workforce intelligence, recruitment and preparation, deployment and spatial allocation, workplace and professional support, and retention, mobility, and attrition. The bibliometric analysis tests whether these domains are visible in the corpus and how their prominence and relationships have changed over time.

3. Methods

Review design and data source

The study used a bibliometric review design combining performance analysis and science mapping (Aria & Cuccurullo, 2017; Donthu et al., 2021). Scopus was used as the sole bibliographic database because the analysis required standardized metadata for authors, affiliations, abstracts, keywords, citation counts, and cited references. Two complementary searches (S02 and S03) returned 523 and 1,018 records, respectively. Their union contained 1,099 unique records after removal of 442 cross-query duplicates. The final Scopus data were

retrieved on 4 August 2026; consequently, publication and citation statistics for 2026 represent partial-year observations.

Eligibility screening and corpus construction

Eligible records were journal articles or reviews concerning school teachers or the teacher workforce in rural, remote, isolated, disadvantaged, underserved, hard-to-reach, archipelagic, frontier, or comparable geographic settings. A record also had to address at least one workforce issue, including distribution, deployment, allocation, shortage, recruitment, attendance, mobility, transfer, retention, attrition, or turnover. Studies focused on higher education, health professions, pedagogical technique without a staffing dimension, or uses of terms such as remote teaching and distributed leadership unrelated to workforce geography were excluded.

Screening used an AI-assisted preliminary classification followed by human responsibility for final decisions. The assigned team member individually reviewed 761 records: all preliminary Include and Unclear records and a prespecified random sample of 85 preliminary Exclude records. Of the audited Exclude sample, 79 decisions were confirmed, five changed to Include, and one changed to Unclear; the 5.9% false-exclusion rate remained below the 10% escalation threshold. Three late duplicates were retained in the audit trail but excluded from the corpora. Reconciliation produced 465 Include, 604 Exclude, and 27 Unclear records. All Unclear records were then adjudicated using verified metadata and available full texts: 13 were retained and 14 excluded, yielding a final bibliometric corpus of 478 unique publications. This workflow does not claim two independent human reviewers and the 478-record set should not be represented as a completed full-text thematic-synthesis corpus.

Table 2. Corpus construction and screening decisions

Selection checkpoint	Records
S02 + S03 retrieved before cross-query deduplication	1,541
Unique records entering screening	1,099
Late duplicates excluded but retained in audit trail	3
Reconciled title-abstract Include	465
Previously Unclear records adjudicated as eligible	13
Final bibliometric corpus	478

Bibliometric analysis and science mapping

Descriptive performance analysis, trend topics, collaboration indicators, and thematic evolution were produced with bibliometrix/Biblioshiny (Aria & Cuccurullo, 2017). Thematic evolution used two evidence-informed periods, 1957–2022 and 2023–2026, and was interpreted from exported tables rather than plot appearance alone. Network analyses were conducted in VOSviewer version 1.6.21 (van Eck & Waltman, 2010). Fractional counting was applied to author co-authorship and source bibliographic coupling; full counting was used for author-keyword co-occurrence, document citation, and cited-reference co-citation; title-abstract terms used binary counting so that a term contributed at most once per document.

Table 3. Final science-mapping parameters

Analysis	Final inclusion rule	Final mapped structure
M01 — author co-authorship	Fractional counting; minimum 3 documents; connected set	16 authors; 4 clusters
M03 — author-keyword co-occurrence	Full counting; minimum 5 occurrences; dedicated thesaurus	38 terms; 6 clusters; 199 links
M04 — title-abstract term co-occurrence	Binary counting; minimum 15 occurrences; 60% most relevant terms; dedicated thesaurus	43 terms; 5 clusters; 729 links
M05 — document citation	Full counting; minimum 10 citations; connected set	14 documents; 4 clusters
M06 — source bibliographic coupling	Fractional counting; minimum 3 documents	42 sources; 5 clusters

Analysis	Final inclusion rule	Final mapped structure
M07 — cited-reference co-citation	Full counting; minimum 20 citations; connected set	22 references; 4 clusters; 191 links

Data cleaning, interpretation, and reproducibility

Thesaurus files consolidated only demonstrably equivalent spelling, grammatical, and lexical variants. Methodological terms, country names, and generic title-abstract terms were removed when they did not differentiate the substantive workforce themes. Related but distinct concepts—such as retention, turnover, attrition, salary, and incentives—were preserved. Cluster labels were assigned only after inspection of item frequencies, total link strengths, and representative publications. All threshold changes and term exclusions were documented. Node proximity and link strength were interpreted as patterns of co-occurrence, collaboration, shared references, or citation connection; they were not treated as evidence of causal effectiveness.

4. Result

Dataset profile and growth of the field

The final corpus comprised 478 Scopus-indexed publications published between 1957 and 2026. Biblioshiny classified 465 records as research articles and 13 as reviews. The corpus contained 20,384 cited references, 1,127 author keywords, and 422 Keywords Plus terms. It involved 1,081 authors across 212 publication sources, with 111 single-authored documents, an average of 2.76 co-authors per document, and an international co-authorship rate of 10.67%. The annual growth rate was 5.98%, the mean document age was 6.83 years, and publications received an average of 20.15 citations.

Table 4. Main characteristics of the final bibliometric corpus

Indicator	Result
Timespan	1957–2026
Documents	478
Articles / reviews	465 / 13
Sources	212
Authors	1,081
References	20,384
Author keywords	1,127
Annual growth rate	5.98%
Average citations per document	20.15
International co-authorship	10.67%

The source and author totals differ by one from the preliminary metadata audit (213 source strings and 1,082 author-name strings). This small discrepancy reflects Biblioshiny normalization rather than a change in the 478-document corpus.

Publication activity remained sparse for more than five decades. Only 37 documents (7.7%) appeared before 2010, followed by 105 documents (22.0%) during 2010–2018. Output accelerated sharply thereafter: 199 publications (41.6%) appeared during 2019–2024, while 137 publications (28.7%) were published in 2025–2026. Overall, 336 documents (70.3%) were published from 2019 onward. The annual count peaked at 82 publications in 2025. The 55 publications indexed for 2026 represent partial-year coverage and therefore should not be interpreted as a decline.

Table 5. Publication growth across analytical periods

Publication period	Documents	Share of corpus
1957–2009	37	7.7%
2010–2018	105	22.0%
2019–2024	199	41.6%
2025–2026	137	28.7%

Publication period	Documents	Share of corpus
2019–2026	336	70.3%

Leading publication sources and contributors

The literature was distributed across a broad and multidisciplinary source base. The International Journal of Educational Development and Rural Special Education Quarterly were the most productive sources, with 15 articles each, followed by Education Sciences (14), the Australian and International Journal of Rural Education (13), and Economics of Education Review (13). This pattern indicates that the field sits at the intersection of rural education, teacher education, education policy, and the economics of public service workforces rather than being concentrated in a single specialist journal.

Table 6. Ten most productive publication sources

Rank	Source	Documents
1	International Journal of Educational Development	15
2	Rural Special Education Quarterly	15
3	Education Sciences	14
4	Australian and International Journal of Rural Education	13
5	Economics of Education Review	13
6	Rural Educator	12
7	Teaching and Teacher Education	11
8	Australian Educational Researcher	10
9	Teachers College Record	9
10	Education Policy Analysis Archives	8

Author productivity was also dispersed. Tran H was the most productive author with nine documents, followed by Lampert J and Murphy S with eight each, and McPherson A with seven. The modest document counts among the leading authors are consistent with a fragmented field composed of several national and thematic research communities.

Table 7. Ten most productive authors

Rank	Author	Documents	Fractionalized output
1	Tran H	9	3.73
2	Lampert J	8	2.87
3	Murphy S	8	1.84
4	McPherson A	7	2.37
5	Goldhaber D	6	1.70
6	Nguyen TD	6	2.75
7	Anglum JC	5	1.58
8	Dadvand B	5	1.67
9	Li J	5	1.58
10	Liu Y	5	1.58

Scientific influence and geographic concentration

The most globally cited document in the corpus was Hanushek et al. (2004), with 720 citations, followed by Achinstein et al. (2010) with 325 citations and Darling-Hammond and Sykes (2003) with 275 citations. Several highly cited works addressed teacher sorting, recruitment and retention, rural staffing, and turnover. Citation counts were strongly age-dependent, however. For example, the 2023 study by Ingersoll and colleagues had 151

citations and the highest normalized citation score among the ten most globally cited documents, indicating exceptional recent influence.

Table 8. Ten most globally cited documents

Rank	Document	Year	Global citations	Normalized citations
1	Hanushek et al.	2004	720	2.65
2	Achinstein et al.	2010	325	3.68
3	Darling-Hammond	2003	275	1.97
4	Monk	2007	273	3.45
5	Castro et al.	2010	269	3.05
6	Grissom et al.	2011	197	3.33
7	Biddle et al.	2016	194	3.39
8	Ronfeldt et al.	2012	176	4.14
9	Clandinin et al.	2015	171	6.33
10	Ingersoll et al.	2023	151	10.45

Country production was highly concentrated. In affiliation-based counts, the United States led with 408 author-country occurrences, followed by Australia (146), China (131), the United Kingdom (33), South Africa (20), and Indonesia (18). Corresponding-author data showed the same hierarchy: the United States accounted for 126 documents (26.36%), China for 62 (12.97%), Australia for 58 (12.13%), and the United Kingdom for 16 (3.35%). Indonesia contributed seven corresponding-author documents (1.46%).

Table 9. Corresponding-author production and international collaboration

Country	Corresponding-author documents	Share	SCP	MCP	MCP ratio
United States	126	26.36%	121	5	3.97%
China	62	12.97%	54	8	12.90%
Australia	58	12.13%	54	4	6.90%
United Kingdom	16	3.35%	10	6	37.50%
Indonesia	7	1.46%	6	1	14.29%
South Africa	7	1.46%	7	0	0.00%

The dominance of single-country publications and the overall international co-authorship rate of 10.67% indicate limited cross-national integration. The United Kingdom displayed a substantially higher collaboration ratio among major producers (37.5%) than the United States (4.0%), Australia (6.9%), and China (12.9%). This geographic structure is important because rural staffing problems are highly context-dependent, yet the field remains led by a small group of national research systems.

Conceptual structure of rural and remote teacher-workforce research

The finalized author-keyword co-occurrence map (M03) contained 38 terms arranged into six clusters and connected by 199 links. The most prominent concepts were teacher retention (59 occurrences; total link strength 96), rural education (45; 50), rural school (37; 40), teacher recruitment (35; 43), teacher shortage (32; 47), teacher turnover (29; 39), teacher attrition (26; 39), rural teacher (23; 29), and teacher mobility (18; 19). Together, these terms show that the literature is organized around the full teacher-workforce cycle: attraction and preparation, recruitment and distribution, workplace experience, mobility and attrition, and continued retention.

The six clusters represent: (1) turnover, attrition, and labor-market policy; (2) rural education, recruitment, mobility, and distribution; (3) retention and professional development; (4) shortages and hard-to-staff schools; (5) general rural and remote education; and (6) rural teachers, job satisfaction, and turnover intention. Conservative synonym consolidation removed methodological terms, country names, and singular-plural duplication while retaining the substantive distinction between rural and remote contexts.

Table 10. Conceptual domains represented in the author-keyword network

Analytical domain	Representative terms	Interpretive focus
Workforce supply and allocation	teacher shortage; teacher distribution; teacher labor market	Availability and spatial allocation of teachers
Recruitment and preparation	teacher recruitment; teacher education; initial teacher education	Entry pathways and readiness for rural service
Retention and attrition	teacher retention; teacher attrition; teacher turnover	Continuity and loss of the rural workforce
Work conditions and motivation	job satisfaction; incentives; professional development; school leadership	Organizational conditions shaping decisions to stay
Equity and rural context	rural education; rural schools; hard-to-staff schools; educational equity	Unequal access to qualified teachers across places

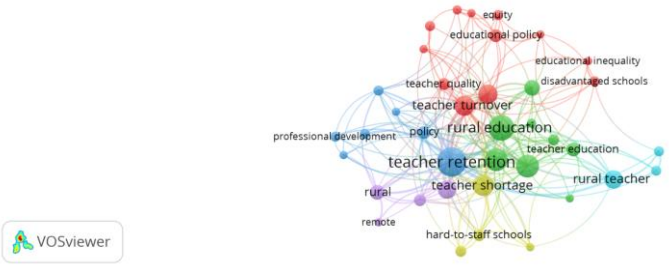

Figure 1. Author-keyword co-occurrence network in rural and remote teacher-workforce research

Note. Full counting; minimum occurrence = 5. Node size represents occurrence, link thickness represents co-occurrence strength, and color identifies the six thematic clusters.

The finalized title-abstract term map (M04) provided an independent semantic check. It retained 43 terms in five clusters, connected by 729 links with a total link strength of 4,036. The dominant terms were teacher quality (72 occurrences; total link strength 225), rural teacher (64; 176), teacher turnover (63; 175), teacher attrition (51; 128), incentive (49; 161), school leadership (47; 131), access (44; 135), professional development (31; 101), teacher distribution (31; 98), and teacher supply (31; 105). Its five themes concerned: teacher quality, distribution, incentives, and equitable access; rural retention, attrition, and mobility; professional development, policy reform, and remote-school teaching; salary-policy implementation and urban comparison; and teacher supply, demand, and specialized staffing.

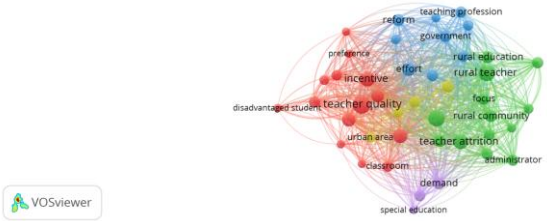

Figure 2. Title-abstract term co-occurrence network in rural and remote teacher-workforce research

Note. Binary counting; minimum occurrence = 15; 60% most relevant terms. The dedicated thesaurus removed 183 generic terms and normalized 44 lexical variants.

Trend topics and thematic evolution

Trend-topic analysis showed a temporal movement from broad policy and labor-market concerns toward a more specialized rural teacher-workforce agenda. Earlier median-year topics included salary (2007), teacher distribution (2016), educational development and labor market (2018), and policy, equity, and teacher quality (2019). More recent topics included rural education and teacher turnover (median year 2023), teacher retention, rural schools, and teacher shortage (2024), followed by educational equity, initial teacher education, and teacher

shortages (2025). Professional experience and school leadership appeared as the newest topics, with median years in 2026.

The final thematic-evolution analysis identified 27 relationships between 1957–2022 and 2023–2026. Rural education and teacher retention displayed the strongest substantive continuity, with 21 and 18 shared occurrences, respectively. Teacher recruitment evolved toward teacher distribution with a weighted inclusion index of 0.500, while equity evolved toward retention with the highest weighted inclusion index among the major links (0.615). Recruitment also converged with rural-school and teacher-retention themes, showing that recent research increasingly treats staffing as a connected governance process rather than as isolated recruitment events.

Table 11. Selected cross-period thematic relationships

Cross-period relationship	Weighted inclusion index	Occurrences	Interpretation
equity → retention	0.615	6	Equity increasingly linked to workforce continuity
teacher recruitment → teacher distribution	0.500	4	Recruitment reframed as spatial allocation
teacher retention → teacher retention	0.444	18	Retention remains a stable core theme
teachers → teachers	0.389	10	General teacher research remains continuous
rural education → rural education	0.362	21	Rural education remains the largest stable stream
teacher recruitment → rural schools	0.206	16	Recruitment increasingly located in rural-school contexts
teacher retention → rural schools	0.206	11	Retention increasingly examined at school level

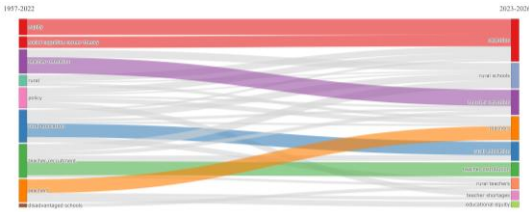

Figure 3. Thematic evolution of rural and remote teacher-workforce research, 1957-2026
Note. Flow width represents thematic continuity between periods. Data for 2026 represent partial-year coverage up to the retrieval date.

Intellectual and source structure

The finalized co-authorship map (M01) contained 16 connected authors in four clusters. Murphy S was the largest node, with eight documents, 36 citations, and a total link strength of 8; Dadvand B followed with five documents, 35 citations, and a total link strength of 5. The remaining connected authors generally had two or three documents and total link strengths between 2 and 3. This compact network confirms that recurring collaboration is concentrated in a small, recent group of researchers rather than distributed across the 1,081 authors in the corpus.

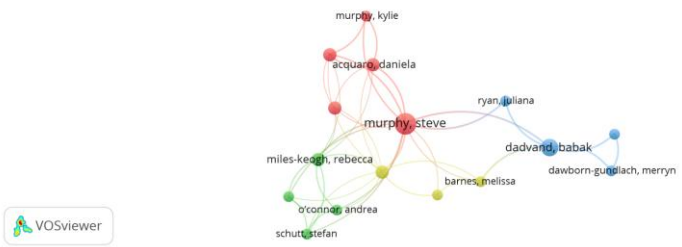

Figure 4. Co-authorship network among recurrent authors
Note. Fractional counting. The map displays the connected set of authors meeting the finalized document threshold.

Bibliographic coupling among 42 sources produced five clusters. Teaching and Teacher Education had the strongest total link strength (240.48), followed by AERA Open (235.31), Economics of Education Review (184.38), Teachers and Teaching: Theory and Practice (175.14), Teachers College Record (174.65), Education Policy Analysis Archives (174.94), and Education Sciences (170.71). The pattern reveals a field connected through at least three broad traditions: teacher development and professional experience; education policy and labor-market analysis; and rural, special, and context-specific education.

Document citation mapping identified 14 connected publications in four clusters. These included foundational studies of deployment and retention in rural Ghana, Zimbabwe, Nigeria, South Africa, Australia, and China, as well as work on teacher migration, out-of-field teaching, and recruitment for hard-to-staff schools. The selective size of the connected network indicates that influence within the narrowly defined rural/remote corpus is distributed across several contextual literatures rather than organized around a single dominant document set.

The finalized cited-reference co-citation map (M07) contained 22 references in four clusters and 191 links. Its intellectual center was dominated by organizational and labor-market explanations of teacher turnover, attrition, mobility, administrative support, and unequal staffing. The strongest total link strengths belonged to How Teacher Turnover Harms Student Achievement (133), Teacher Turnover and Teacher Shortages: An Organizational Analysis (127), and Teacher Attrition and Retention: A Meta-Analytic and Narrative Review (114). The network also connected work on school administrators, teaching conditions, teacher sorting, and recruitment and retention, indicating that the field draws simultaneously on organizational, equity, and labor-market traditions.

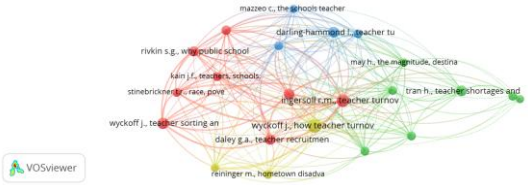

Figure 5. Co-citation network of foundational cited references

Note. Node size represents citations within the corpus, link thickness indicates co-citation strength, and colors identify four intellectual clusters.

Integrated result

Taken together, the evidence shows a field that has expanded rapidly since 2019 but remains geographically concentrated and only modestly internationalized. Its conceptual center has shifted from broad questions of rural education, salary, and generic teacher supply toward an integrated concern with recruitment, deployment, mobility, shortages, attrition, and retention. The strongest emerging contribution for public administration is therefore not simply the identification of a teacher shortage. It is the recognition that equitable rural staffing is a multi-stage governance problem involving workforce planning, allocation rules, incentives, organizational support, professional development, local leadership, and long-term retention.

Discussion

From teacher shortage to a teacher-workforce governance system

The central finding is that rural and remote teacher staffing has evolved from a narrow shortage problem into a multi-stage governance problem. Across M03, M04, trend topics, and thematic evolution, recruitment is inseparable from distribution, workplace support, mobility, attrition, and retention. This pattern matters for public administration because it changes the relevant unit of analysis. The policy object is not merely the number of teachers posted to disadvantaged locations; it is the institutional system that attracts candidates, allocates them geographically, supports them after placement, and sustains their willingness and capacity to remain.

The thematic transition from teacher recruitment to teacher distribution, together with the continuity of retention and rural education, indicates that entry-focused interventions are unlikely to be sufficient on their own. Recruitment can temporarily fill vacancies, but the recurrence of turnover, attrition, job satisfaction, school leadership, and professional development shows that staffing outcomes are produced throughout the employment cycle. Studies within the corpus reinforce this interpretation: Achinstein et al. (2010) positioned retention as a central challenge in hard-to-staff schools; Opoku et al. (2020) identified conditions supporting retention in rural Ghana; and Tran et al. (2020) emphasized realistic job information in rural recruitment and retention. The bibliometric structure therefore supports a lifecycle model rather than a vacancy-filling model.

Administrative capacity and the implementation gap

The prominence of implementation, effectiveness, access, teacher distribution, and school leadership in M04 suggests that formal policy design is only one component of equitable staffing. Rural deployment depends on administrative capacity to forecast demand, maintain reliable personnel data, match teachers to vacancies, administer incentives, coordinate across levels of government, and respond to local school conditions. Where these functions are fragmented, nominal teacher supply may coexist with persistent spatial maldistribution.

This interpretation is consistent with the appearance of teacher allocation, labor-market, and leadership themes across the network. Özoğlu (2015), for example, examined the unequal regional distribution of novice and senior teachers, while Tran et al. (2023) showed that different forms of administrative support matter for retention across school types. The implication is that rural staffing policy should be evaluated not only by inputs or appointments, but by a chain of administrative outputs: vacancy identification, placement fit, time-to-fill, continuity after placement, instructional availability, and distributional equity.

Incentives are necessary but institutionally incomplete

Salary and incentive remain visible themes, but neither occupies the conceptual network alone. They are linked to teacher quality, access, leadership, motivation, job satisfaction, and retention. This configuration cautions against treating financial incentives as a self-sufficient solution. Monetary compensation can offset hardship and opportunity costs, but its effect is conditioned by housing, workload, professional isolation, career progression, school leadership, community relations, and access to professional development.

The policy implication is to design incentive packages as bundles of material and organizational support. A governance-oriented package may combine location-based compensation with transparent eligibility rules, reliable payment, housing or transport assistance, mentoring, professional-learning access, career credit, family support, and predictable transfer pathways. The precise bundle should remain context-sensitive; the cross-country fragmentation of the literature warns against assuming that an arrangement effective in one national system will transfer automatically to another.

Equity requires attention to distribution and retention

Educational equity was among the newest M03 and M04 themes and formed the strongest major thematic-evolution link toward retention. This suggests a conceptual shift: equity is increasingly understood not simply as equal access to schools, but as sustained access to qualified and stable teachers. In this framing, turnover and attrition are distributional outcomes because they repeatedly expose remote and disadvantaged schools to vacancies, novice concentration, discontinuity, and weaker institutional memory.

The geographic concentration of publications adds an evidence-equity concern. The United States, China, and Australia accounted for a large share of corresponding-author documents, while international co-authorship was only 10.67%. Yet administrative arrangements, labor markets, transport systems, fiscal capacity, and rurality differ markedly across countries. Underrepresented settings—including archipelagic, frontier, indigenous, and low-capacity jurisdictions—should therefore be treated as knowledge gaps, not merely additional locations for replicating established models.

Fragmented collaboration and the need for comparative learning

M01 confirms that the field has only a small recurrent collaboration core: 16 connected authors from a corpus involving 1,081 authors. M07, by contrast, reveals a recognizable shared intellectual base around turnover, attrition, mobility, administrative support, and staffing inequality. The coexistence of a common reference base with limited author collaboration implies intellectual convergence without equivalent organizational integration. Researchers often address related problems, but do so within nationally or thematically bounded teams.

A productive next step is coordinated comparative research using shared definitions and indicators while preserving contextual explanation. Comparable measures of vacancy duration, deployment mismatch, incentive receipt, early-career exit, transfer, leadership support, and multi-year retention would allow stronger cross-jurisdiction learning. Mixed networks connecting public administration, education policy, labor economics, rural studies, and local practitioners could also reduce the present separation between system-level allocation research and school-level retention research.

Proposed integrated framework and research agenda

The combined evidence supports an integrated rural teacher-workforce governance framework with five linked domains: (1) demand and workforce intelligence; (2) recruitment and preparation; (3) deployment and spatial allocation; (4) workplace and professional

support; and (5) retention, mobility, and attrition. Equity is a cross-cutting criterion, while administrative capacity and intergovernmental coordination operate as enabling conditions. Outcomes should be assessed at three levels: staffing outputs, workforce stability, and equitable educational access.

Table 12. Integrated rural teacher-workforce governance framework

Framework domain	Core governance function	Illustrative indicators
Demand and workforce intelligence	Forecast needs and identify hard-to-staff locations	Vacancy accuracy; subject mismatch; time-to-fill
Recruitment and preparation	Build context-ready entry pathways	Applicant pool; rural preparation; placement acceptance
Deployment and allocation	Distribute teachers transparently and equitably	Geographic balance; qualification match; novice concentration
Workplace and professional support	Sustain performance and attachment after placement	Leadership support; mentoring; professional development; incentive reliability
Retention, mobility, and attrition	Manage continuity and legitimate movement	One-, three-, and five-year retention; turnover; transfer; exit reasons

Future research should test relationships across these domains instead of examining isolated instruments. Priority questions include which combinations of financial and non-financial support work under different remoteness conditions; how local leadership interacts with centrally designed allocation rules; how digital personnel systems improve or reproduce distributional inequity; and how teacher preferences, family constraints, and community embeddedness alter policy implementation. Longitudinal and comparative designs are especially important because cross-sectional counts cannot distinguish temporary placement from durable workforce stability.

Contribution to public administration

This study contributes to public administration by reframing rural teacher staffing as the governance of a geographically distributed public-service workforce. It integrates supply, recruitment, deployment, organizational support, mobility, attrition, and retention within one administrative sequence and positions equity as an outcome of both allocation and continuity. The dual conceptual mapping also strengthens the result: M03 captures author-designated concepts, while M04 independently confirms the vocabulary embedded in titles and abstracts.

5. Conclusions

Research on rural and remote teacher workforces has moved from a scattered concern with teacher supply and rural schooling toward a rapidly expanding, interconnected field centered on distribution, shortages, recruitment, turnover, attrition, retention, organizational support, and educational equity. The acceleration since 2019 demonstrates growing policy attention, but the limited international co-authorship network and the concentration of publication activity in a small number of countries constrain the diversity of administrative settings represented in the evidence base.

The principal contribution is a shift in how the policy problem is defined. Rural staffing should not be governed as a sequence of isolated vacancy-filling decisions. It is a workforce cycle linking demand intelligence, recruitment and preparation, spatial allocation, workplace and professional support, and the management of mobility and attrition. Equity depends on both where qualified teachers are initially placed and whether public institutions can sustain their presence. Financial incentives therefore require integration with reliable administration, leadership support, professional development, housing or transport assistance, career pathways, and context-sensitive coordination across levels of government.

For research, the framework directs attention toward longitudinal and comparative tests of how these domains interact under different forms of remoteness, fiscal capacity, and institutional design. For practice, it supports monitoring systems that connect vacancies, placement fit, incentive delivery, teacher movement, retention duration, and student access to qualified teachers. The durable policy objective is not simply to place teachers in remote schools, but to build administrative systems capable of sustaining an equitable, context-ready, and professionally supported workforce over time.

The findings are bounded by the use of Scopus as the sole bibliographic database, which may underrepresent locally indexed and non-English scholarship from rural and remote jurisdictions. Author and affiliation disambiguation can affect productivity and collaboration counts, while citation indicators favor older publications and highly indexed research communities. Records for 2026 cover only the period available at the 4 August retrieval date and must not be interpreted as a complete publication year. The screening design used AI-assisted preliminary classification with targeted human audit and final human adjudication; it did not involve two independent human reviewers and the 478-record corpus should not be represented as a completed full-text thematic synthesis. Finally, bibliometric proximity and link strength identify patterns of attention, collaboration, and intellectual connection but do not demonstrate causal effectiveness. The proposed governance framework therefore requires subsequent systematic qualitative synthesis and empirical validation before particular policy packages can be judged.

References

Aguado-Riveros, U. I., Espinoza-Quispe, L. E., Santillán-Enciso, C. L., Silva-Infantes, M., Barrionuevo-Inca-Roca, Y. A., Astuñaupa-Flores, S. N., Poma-Lagos, L. A., Navarro-Véliz, J. A., & González-Prida, V. (2026). Reducing administrative burden through simplification and document management in local governments: Evidence from a district-level public organization. *Societies, 16*(3), 91. https://doi.org/10.3390/soc16030091

Astudillo-Rodas, M., Venancio-Rodriguez, J., & Hetling, A. (2024). Assessing unintended administrative burdens of technology: The case of swipe card attendance for child care subsidies. *Journal of Policy Studies, 39*(4), 123–142. https://doi.org/10.52372/jps.e674

Baekgaard, M., & Madsen, J. K. (2024). Anticipated administrative burdens: How proximity to upcoming compulsory meetings affect welfare recipients' experiences of administrative burden. *Public Administration, 102*(2), 425–443. https://doi.org/10.1111/padm.12928

Bell, E., Christensen, J., Herd, P., & Moynihan, D. (2023). Health in citizen-state interactions: How physical and mental health problems shape experiences of administrative burden and reduce take-up. *Public Administration Review, 83*(2), 385–400. https://doi.org/10.1111/puar.13568

Bielefeld, S. (2021). Administrative burden and the Cashless Debit Card: Stripping time, autonomy, and dignity from social security recipients. *Australian Journal of Public Administration, 80*(4), 891–911. https://doi.org/10.1111/1467-8500.12509

Chudnovsky, M., & Peeters, R. (2022). A cascade of exclusion: Administrative burdens and access to citizenship in the case of Argentina's National Identity Document. *International Review of Administrative Sciences, 88*(4), 1068–1085. https://doi.org/10.1177/0020852320984541

Daigneault, P.-M., Journeault, M., Lauzon-Rhéaume, L., & Birch, L. M. (2025). Measuring administrative burden: Bringing the state "back in" as a reflexive actor in burden reduction. *Public Administration*. Advance online publication. https://doi.org/10.1111/padm.70036

Daigneault, P.-M., & Macé, C. (2020). Program awareness, administrative burden, and non-take-up of Québec's Supplement to the Work Premium. *International Journal of Public Administration, 43*(6), 527–539. https://doi.org/10.1080/01900692.2019.1636397

Fox, A., Feng, W., & Reynolds, M. (2023). The effect of administrative burden on state safety-net participation: Evidence from food assistance, cash assistance, and Medicaid. *Public Administration Review, 83*(2), 367–384. https://doi.org/10.1111/puar.13497

Halling, A., & Baekgaard, M. (2024). Administrative burden in citizen-state interactions: A systematic literature review. *Journal of Public Administration Research and Theory, 34*(2), 180–195. https://doi.org/10.1093/jopart/muad023

Ilea, P., & Ilea, I. (2024). Administrative burden for patients in U.S. health care settings post-Affordable Care Act: A scoping review. *Social Science & Medicine, 345*, 116686. https://doi.org/10.1016/j.socscimed.2024.116686

Kang, I., Sievert, M., & Na, C. (2025). Development of a scale to measure perceived administrative burden, with broad applicability beyond direct policy clients. *Governance, 38*(3), e70026. https://doi.org/10.1111/gove.70026

Madsen, C. Ø., Lindgren, I., & Melin, U. (2022). The accidental caseworker: How digital self-service influences citizens' administrative burden. *Government Information Quarterly, 39*(1), 101653. https://doi.org/10.1016/j.giq.2021.101653

Mikkelsen, K. S., Madsen, J. K., & Baekgaard, M. (2024). Is stress among street-level bureaucrats associated with experiences of administrative burden among clients? A multilevel study of the Danish unemployment sector. *Public Administration Review, 84*(2), 248–260. https://doi.org/10.1111/puar.13673

Moynihan, D., Gerzina, J., & Herd, P. (2022). Kafka's bureaucracy: Immigration administrative burdens in the Trump era. *Perspectives on Public Management and Governance, 5*(1), 22–35. https://doi.org/10.1093/ppmgov/gvab025

Moynihan, D., Herd, P., & Harvey, H. (2015). Administrative burden: Learning, psychological, and compliance costs in citizen-state interactions. *Journal of Public Administration Research and Theory, 25*(1), 43–69. https://doi.org/10.1093/jopart/muu009

Petersen, O. H., Hansen, J. R., & Houlberg, K. (2024). The administrative burden of doing business with the government: Learning and compliance costs in business-government interactions. *Public Administration, 102*(1), 188–206. https://doi.org/10.1111/padm.12904

Ritzel, C., Mack, G., Portmann, M., Heitkämper, K., & El Benni, N. (2020). Empirical evidence on factors influencing farmers' administrative burden: A structural equation modeling approach. *PLOS ONE, 15*(10), e0241075. https://doi.org/10.1371/journal.pone.0241075

Schneider, V. C., & Rubenstein, R. (2026). Can administrative capacity moderate the distributional effects of administrative burden? The case of FAFSA completion. *Research in Higher Education, 67*(4), 24. https://doi.org/10.1007/s11162-026-09901-w

Senghaas, M., Köppen, M., & Röhrer, S. (2026). Welfare conditionality as administrative burden: The perceived costs of (potential) sanctions and how welfare claimants cope with it. *Social Policy & Administration, 60*(5), 761–770. https://doi.org/10.1111/spol.70041

Soler-Buades, L., & Ferraioli, F. (2025). The nexus between welfare rescaling and administrative burden: The case of minimum income provision in Spain. *Journal of International and Comparative Social Policy, 41*(3), 248–262. https://doi.org/10.1017/ics.2025.10039

St. John, V. J., Wilson, G. D., Tran, L., Applin, L., & Evans, D. (2026). Administrative burden in higher education: Race, criminal records, and street-level bureaucrats in college admissions. *Public Administration Review, 86*(3), 662–674. https://doi.org/10.1111/puar.70042

Storseth, O., McNeil, K., Grudniewicz, A., Correia, R. H., Gallant, F., Thelen, R., & Lavergne, M. R. (2025). Administrative burden in primary care: Critical review. *Canadian Family Physician, 71*(6), 417–423. https://doi.org/10.46747/cfp.7106417

Tarshish, N., & Holler, R. (2024). "You didn't ask, so you don't know": Information and administrative burden in social benefit claims. *Social Policy & Administration, 58*(5), 800–813. https://doi.org/10.1111/spol.12992

Vogel, R., Dahlweg, A., & Hattke, F. (2025). Do vulnerable citizens (really) perceive higher bureaucracy costs? Testing a key claim of the administrative burden framework. *Public Administration Review, 85*(4), 1098–1114. https://doi.org/10.1111/puar.13932

Zhou, S., & Mast, E. (2026). Explaining burden reduction in municipal service delivery: The case of streamlined electric vehicle charger permitting in California. *Public Administration Review*. Advance online publication. https://doi.org/10.1111/puar.70088