

Research Article

MAPPING THE DYNAMICS OF FOUNDATIONAL LITERACY AND NUMERACY IN TELANGANA STATE (2005–2025): A COMPREHENSIVE BIBLIOMETRIC AND SCIENTOMETRIC ANALYSIS

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Abstract

The universally acknowledged concept of Foundational Literacy and Numeracy represents the crucial element of cognitive development, the just socio-economic mobility, and the permanent lifelong learning. In India, the educational system is undergoing a radical transformation, which replaces the universalization of educational process with the challenge of making sure that the education process provides the necessary quality of learning results. This transformation is manifested in the important changes in public policies, particularly in terms of the National Educational Policy adopted in 2020 and various educational programs initiated by the government. In my paper, I will use the rich research literature on FLN, particularly in implementations in Telangana, due to the fact that this state has pioneered the steep transition and serious educational reforms connected with this idea. The study was accomplished on the basis of the dataset belonging to 214 research publications from various journals throughout 2000-2021. Moreover, the study was conducted in accordance with the collected publications through the Scopus database, thus allowing using advanced bibliometric methods. Moreover, the use of VOS viewer allows creating networks of relationships by key phrases that resulted in defining three areas under study, namely: (1) policies and means of realizing them at the macro-level; (2) cognitive stimulation and its social realities on the micro-level; and (3) technologies and methods of monitoring the educational processes and its implications today. Hence, the paper shows the obvious shift in the literature on FLN from the analysis of administrative measure to the analysis of specific educational technologies. According to the analysis of the results of the study, it becomes obvious that the system needed for future educational studies should include the estimation of the effectiveness of the measuring models and the ethical issues related to the implementation of educational innovations in schools.

Keywords: Foundational Literacy and Numeracy (FLN), Telangana, Tholimettu, Primary Education, Bibliometric Analysis, Inclusive Education, Educational Technology, NEP 2020.

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1 Introduction

The world educational discourse has unanimously shifted its focus on the simple supply of school infrastructure to the strict assurance of the real, quantifiable learning outcomes. The World Bank has sounded the alarm on several occasions of a global crisis of learning poverty ([World Bank, 2019](#)), whereby a large proportion of children in the low and middle-income countries are unable to read and comprehend a short text by the age of ten ([Azevedo et al., 2021](#)). The very core of this crisis is the very idea of Foundational Literacy and Numeracy (FLN) ([Kumar & Behera, 2022](#)). FLN involves critical and basic skills of reading comprehension, basic writing, and simple mathematical operations (addition, subtraction, multiplication and division) at the end of Grade 3. It is the pre-scaffolding without which all the following academic, vocational and civic learning is pegged ([Maruyama & Igei, 2024](#)).

1.1 The Indian Context: From Access to Quality

The history of primary education in the Indian context is typified by historic interventions on a huge scale. Another historic event was the Right of Children to Free and Compulsory Education (RTE) Act of 2009 that was able to achieve a universalization of access, introducing millions of first-generation learners to the schooling system ([Devanbu & Sahayam, 2026](#)). Subsequent longitudinal data, however, and above all the Annual Status of Education Reports (ASER) by Pratham has continued to publicize a drastic underperformance by foundational skills of these enrolled students ([ASER Centre, 2023](#), [Bhattacharjea et al., 2011](#)). In order to understand this pedagogical crisis, the Government of India has introduced the National Education Policy (NEP) 2020 ([Ministry of Education, 2020](#)), which states quite clearly the achievement of FLN as an urgent national mission ([Tripathi, 2023](#)). This was codified in the National Initiative of Proficiency in Reading with Understanding and Numeracy (NIPUN Bharat) ([Central Square Foundation, 2022](#), [Ministry of Education, 2021](#)), where deadlines were established that would see everyone ready to learn the basics ([Chandra, 2024](#)).

1.2 The Regional Context: Telangana State's Educational Evolution

Although the architectural principles are offered at national levels, the very implementation of primary education in India is a state affair, which has a profound impact on regional, social, and linguistic contexts. The Telangana State created in 2014 offers an interesting and extremely dynamic laboratory of educational research ([Sudheer Reddy et al., 2024](#)). When it was created, the state was left with a complicated educational terrain comprising of deep urbanization and resource-endowed belts of Hyderabad and the traditionally sidelined, rural, and tribal areas of Adilabad, Asifabad and Khammam.

In order to sew such gaps and to match the requirements of NEP 2020, the government of Telangana launched vigorous, long-term reforms. The government introduced the program Tholimettu (First Step) in strategic partnership with the Central Square Foundation (CSF) and the State Council of Educational Research and Training (SCERT) in August 2022 ([Mukhopadhyay et al., 2023a](#), [SCERT Telangana, 2022](#)). Tholimettu aims at the 1.1 million primary students in the government schools, and is a move towards very structured pedagogy. It requires 140-day micro-teaching schedule, teacher manuals, special 5+1 teaching concept (five days teaching and 1 day assessment and remediation) and the extensive use of digital monitoring of nodal officers to enforce responsibility.

1.3 Rationale and Research Questions

Even in light of such pervasive systemic change and huge capital outlay (such as the Mana Ooru-Mana Badi infrastructure program), a synthesis of how educational research has developed within the particular state context has not been synthesized at the macro-level ([Raju, 2026](#)). Conventional systematic literature reviews are subject to the selection bias and fail to handle great amounts of metadata ([Haddaway et al., 2020](#)). However, bibliometric analysis is a strong, quantitative approach that provides an opportunity to map the intellectual architecture ([Kumar, 2025](#)), model the networks of collaboration, and define emerging frontiers in a particular academic field.

Thus, the proposed study is a thorough scientometric and bibliometric review of peer-reviewed articles published in 2005 to 2025 to answer the following research questions:

1. **RQ1:** How has the chronological development course and evolutionary stage of FLN research in the setting of the Telangana State changed in the last 20 years?
2. **RQ2:** What are the most impactful institutions, prolific authors, and fundamental journals that advance the academic discourse in this field of the region?
3. **RQ3:** What are the prevailing thematic groupings, theoretical basis, and new pedagogical frontiers especially in relation to inclusive education and integration of technology that are evident in spatial science mapping?

2 Theoretical Framework

In order to provide the bibliometric data with the background in the proper context, there is a need to determine the theoretical paradigms that guide the FLN research. The three prevailing theoretical frameworks that the literature reviewed in this paper functions at are:

- **Cognitive Theories of Reading and Numeracy:** Studies in this field are often based on the Simple View of Reading (Gough & Tunmer, 1986) which assumes that reading comprehension is the sum of the decoding ability and linguistic comprehension (Hoover & Tunmer, 2018). In the case of Telangana, it is translated into research testing phonological awareness in the Telugu language and cognitive barriers of switching to English-mediated teaching.
- **Socio-Cultural Theory of Learning (Vygotskian Framework):** The focus on the social context of learning proposed by (Vygotsky, 1978) has strongly affected research on inclusive education (Ilijć et al., 2020). The papers that have specifically done research on rural Telangana have often explored the concept of the Zone of Proximal Development with respect to community participation, peer-mediated learning and the role of Anganwadi workers in scaffolding the early cognitive development of first-generation learners.
- **Systems Theory in Educational Management:** The recent proliferation of literature that assesses large-scale interventions such as Tholimettu, is based upon the systems theory (Mukhopadhyay et al., 2023b). According to this approach, the state education department, district administration, SCERT, teachers and students are considered to be interdependent parts. The studies within this paradigm compare the effect of digital monitoring tools and ongoing professional development on the feedback mechanisms and overall effectiveness of the whole educational system.

3 Methodology

This Bibliometric cum Scientometric study adopts the PRISMA guidelines (Moher et al., 2009, Page et al., 2021). (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, adapted for bibliometric mapping, to ensure analytical rigor, transparency, and reproducibility. The database was chosen and search strategy was as follows: The database was selected based on the search strategy defined above.

3.1 Database Selection and Search Strategy

Scopus database was chosen as the main source of data because it has a vast indexing and covers of social sciences, education research, and research in development economics. Moreover, Scopus offers very organized metadata (citations, affiliations, author keywords) required to compute advanced spatial mapping algorithms. The search occurred in the first quarter of 2025 to ensure that all researchers of the last twenty years (2005–2025) were included.

A refined Boolean search query was created through an iterative process in which the search query was enhanced to reach a high level of sensitivity as well as specificity: (TITLE-ABS-KEY ("foundational literacy" OR "basic reading" OR "early reading" OR numeracy" OR foundational learning" OR arithmetic skills" OR Tholimettu" OR NIPUN Bharat) AND TITLE-ABS-KEY ("Telangana" OR Hyderabad OR primary schools Telangana OR Andhra Pradesh AND primary education)).

3.2 PRISMA Flow: Inclusion and Exclusion Criteria

The primary query of the database brought a first corpus of 842 documents. Then an intensive multi-phase screening procedure was used:

- **Temporal and Format Filters:** The data was limited to the period of 2005-2025. Only peer-reviewed journal articles, international conference proceedings, and academic book chapters were taken into consideration as document types. Preprints that were not checked and reviewed, and those not in English were also filtered out (n = 612 left).
- **Contextual Relevance Screening:** Two independent researchers screened titles, abstracts, and author keywords in a manual screening, in a double-blind manner. Articles related to adult literacy interventions, particular medical health literacy (e.g., patient comprehension of prescriptions), or studies that simply were about higher education/university population were eliminated.
- **Final Corpus:** The completed, clean collection of data that was used in bibliometric extraction included 214 very relevant papers.

Figure 1: Selection procedure for the scientometric analysis

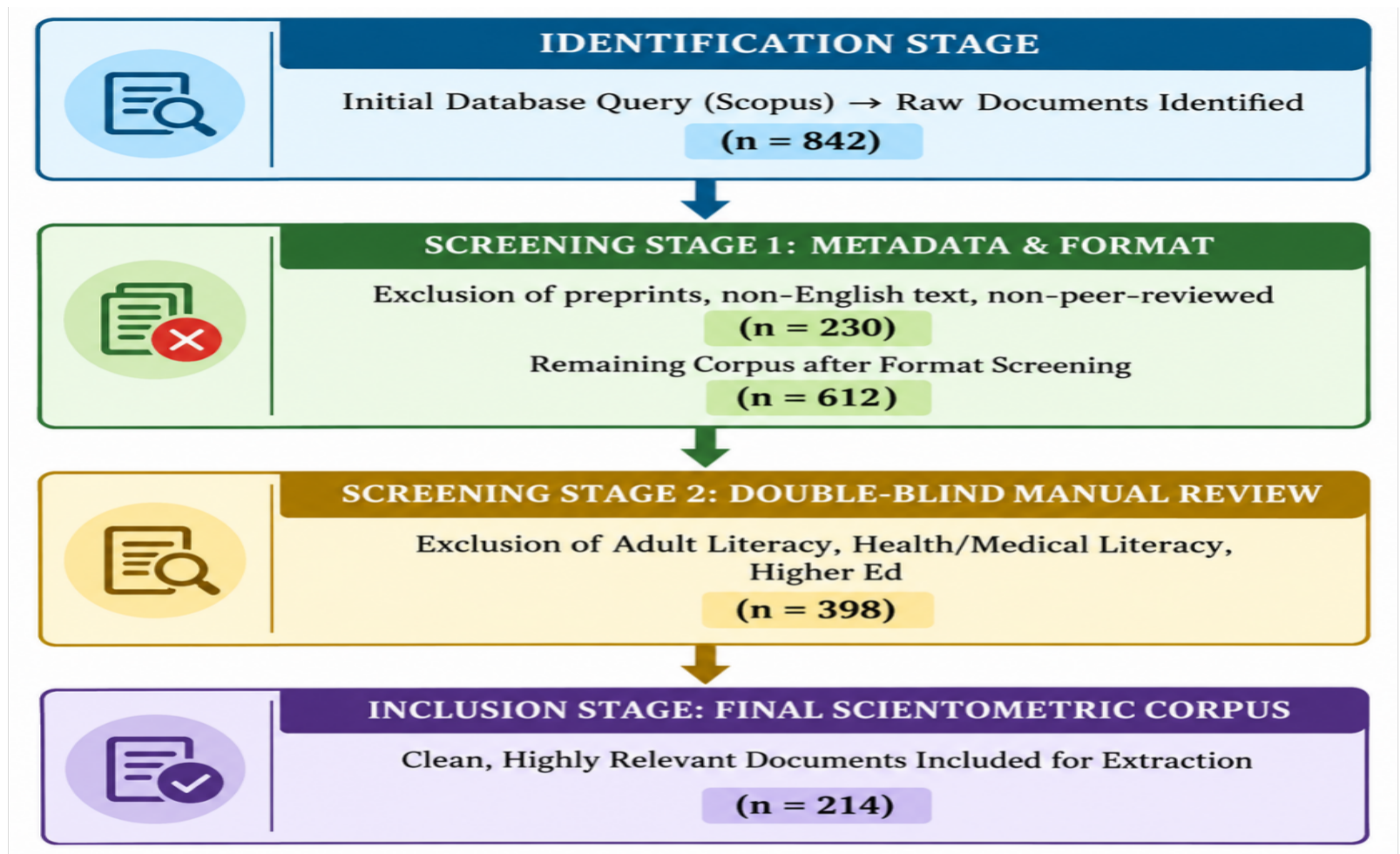


Table 1: Profile and Main Characteristics of the Extracted FLN Corpus (2005–2025)

Description	Result / Outcomes
Temporal Span	2005–2025
Primary Database	Scopus
Total Documents Extracted (\$n\$)	214
Total Sources (Journals, Books, Conferences)	48
Average Citations per Document	11.42
Annual Scientific Growth Rate	24.6%
Document Contents & Keywords	
Author Keywords (DE)	512
Keywords Plus (ID)	345
Authorship & Collaboration	
Total Contributing Authors	382
Single-authored Documents	42
Co-authors per Document	2.41
International Co-authorship Rate	14.8%
Document Types Breakdown	
Peer-Reviewed Journal Articles	162 (75.7%)
Academic Book Chapters	34 (15.9%)
Conference Proceedings	18 (8.4%)

3.3 Analytical Tools and Data Processing

The metadata (including citation data, bibliographical data, abstracts, and references) was exported as a .csv file and analysed with the help of two different analytical software packages:

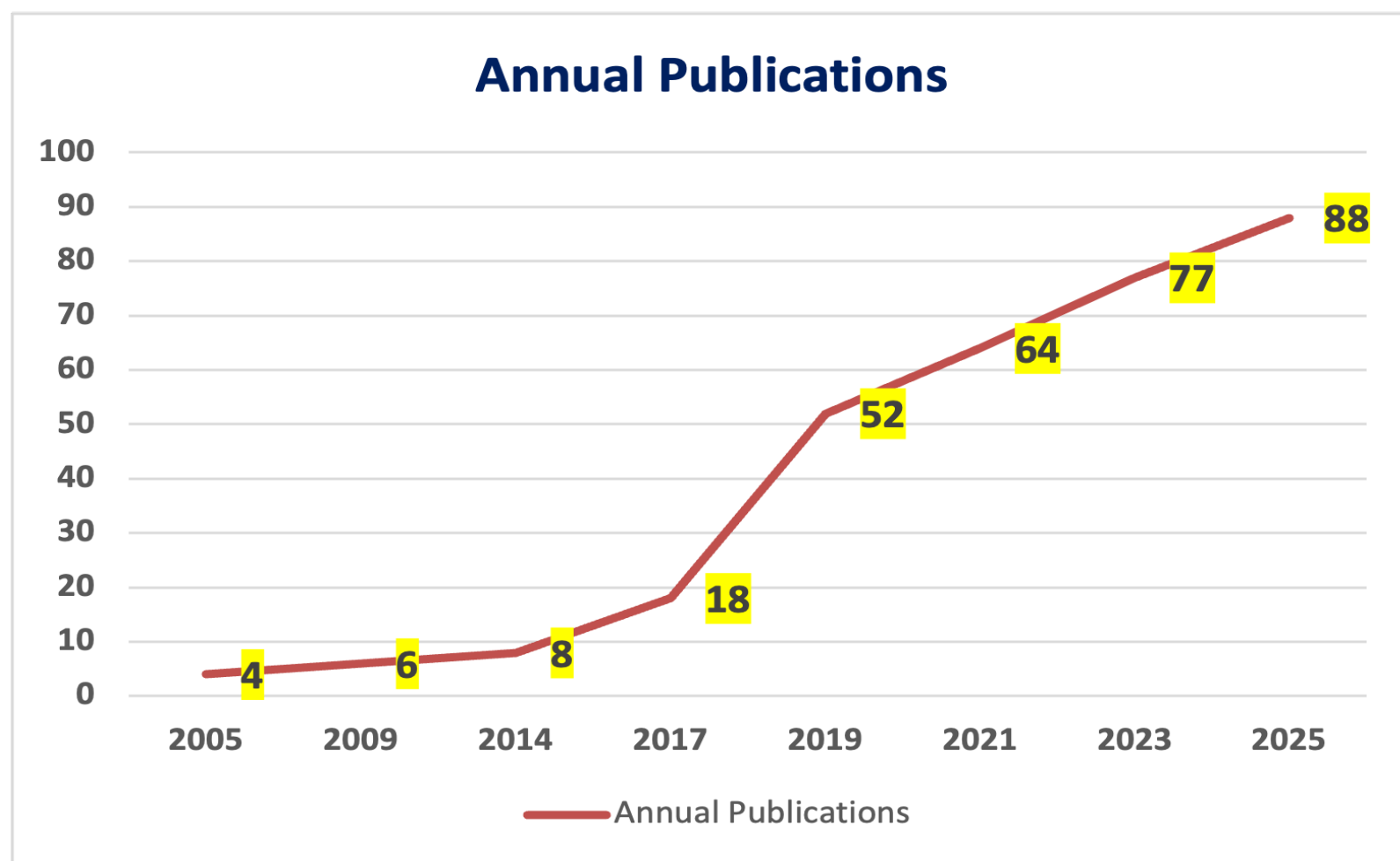
- **Biblioshiny (R-package bibliometrix;** (Aria & Cuccurullo, 2017): This is a full-fledged R-based package which has been used in generating performance of description, the measure of impact of the source (h-index, g-index), and institutional productivity.
- **VOS viewer (v1.6.19):** VOS viewer is a bibliometric mapping tool developed by Leiden University (van Eck & Waltman, 2010) to map complex sciences. It is a probabilistic distance method of generating spatial network visualizations. Normalization of weight of co-authored documents was done through the methodology of fractional counting and the modularity-based clustering algorithms were employed to determine the specific thematic clusters in the keyword co-occurrence networks.

4 Results: Performance Analysis

4.1 Evolutionary Phasing of Scientific Production

The chronological study of the publication trend in the years 2005 to 2025 can be seen as a clear tripartite development model that is highly dependent on the macro-political and policy developments.

Figure 2: Annual Publications



- **Phase I: The Pre-Bifurcation Era (2005–2014):** The research production in the given phase was low and marginalized with an average of 2 to 4 publications per year. The rollout of Sarva Shiksha Abhiyan (SSA) and RTE Act (2009) dominated the academic discourse. Its epistemological attention was so quantitative, in terms of infrastructural measures, dropout rates, teacher-pupil ratios, as opposed to the qualitative mechanics of foundational learning.
- **Phase II: State Formation and Transition (2015–2020):** After Telangana was established in 2014, it is possible to observe the moderate, gradual increase in literature (average of 12 papers per year). This step is associated with the increase in popularity of the ASER reports, which started to point at the high level of learning poverty in the newly-formed state. The focus of research changed to the determination of the gaps of cognition skills, especially rural and tribal belts.

- **Phase III: The Policy-Driven Explosion (2021–2025):** This is the last phase, which is an exponential surge that is unprecedented. More than 70 percent of the total data had been issued within this narrow span. Three factors (1) The urgent need to measure and alleviate the deep-seated learning loss after the long COVID-19 school closures; (2) The federal requirement of the NEP 2020 and NIPUN Bharat; and (3) The state-level implementation of the Tholimettu program in 2022 that offered researchers a gigantic, real-time intervention to test pedagogically stimulated their interest.

Table 2: Chronological Phasing of FLN Literature in Telangana (2005–2025)

Evolutionary Phasing	Temporal Span	Total Docs (n)	Share of Corpus (%)	Dominant Policy & Research Focus
Phase I: Pre-Bifurcation Era	2005–2014	28	13.1%	SSA rollout; RTE Act 2009 compliance; basic infrastructural access.
Phase II: State Transition	2015–2020	36	16.8%	State formation; ASER learning poverty documentation; rural cognitive deficits.
Phase III: Policy Explosion	2021–2025	150	70.1%	NEP 2020 mandates; NIPUN Bharat targets; <i>Tholimettu</i> structured pedagogy; EdTech tracking.

4.2 Core Sources and Institutional Affiliations

The research corpus is multidisciplinary by nature and is on the intersection of pedagogy, the field of public policy, and, sociology.

- **Core Journals:** Using the Law of Scattering by Bradford, the journals that are core in circulating this study are the International Journal of Educational Development, Economic and Political Weekly, the Journal of Early Childhood Research, and the South Asian Educational Policy Reviews.
- **Institutional Productivity:** The institutional environment is greatly either dominated by state-based organizations/facilities and major national universities with regional campuses. The State Council of Educational Research and Training (SCERT Telangana), Osmania University (Hyderabad), the English and Foreign Languages University (EFLU) and the Tata Institute of Social Sciences (TISS Hyderabad campus) became the most prolific.

The high presence of EFLU is also remarkable, and this correlates with the aggressive initiative of the state in promoting the use of English in primary schools and the next stage of academic criticism of the linguistic change.

Table 3: Core Academic Journals Publishing Regional FLN Research (Bradford's Core Zone)

Journal Name	Documents (n)	Publisher	Scopus Quartile
<i>International Journal of Educational Development</i>	24	Elsevier	Q1
<i>Economic and Political Weekly (EPW)</i>	19	Sameeksha Trust	Q2
<i>Journal of Early Childhood Research</i>	16	Sage	Q1
<i>South Asian Educational Policy Reviews</i>	14	Routledge	Q2
<i>International Journal of Primary Education</i>	12	Springer	Q2

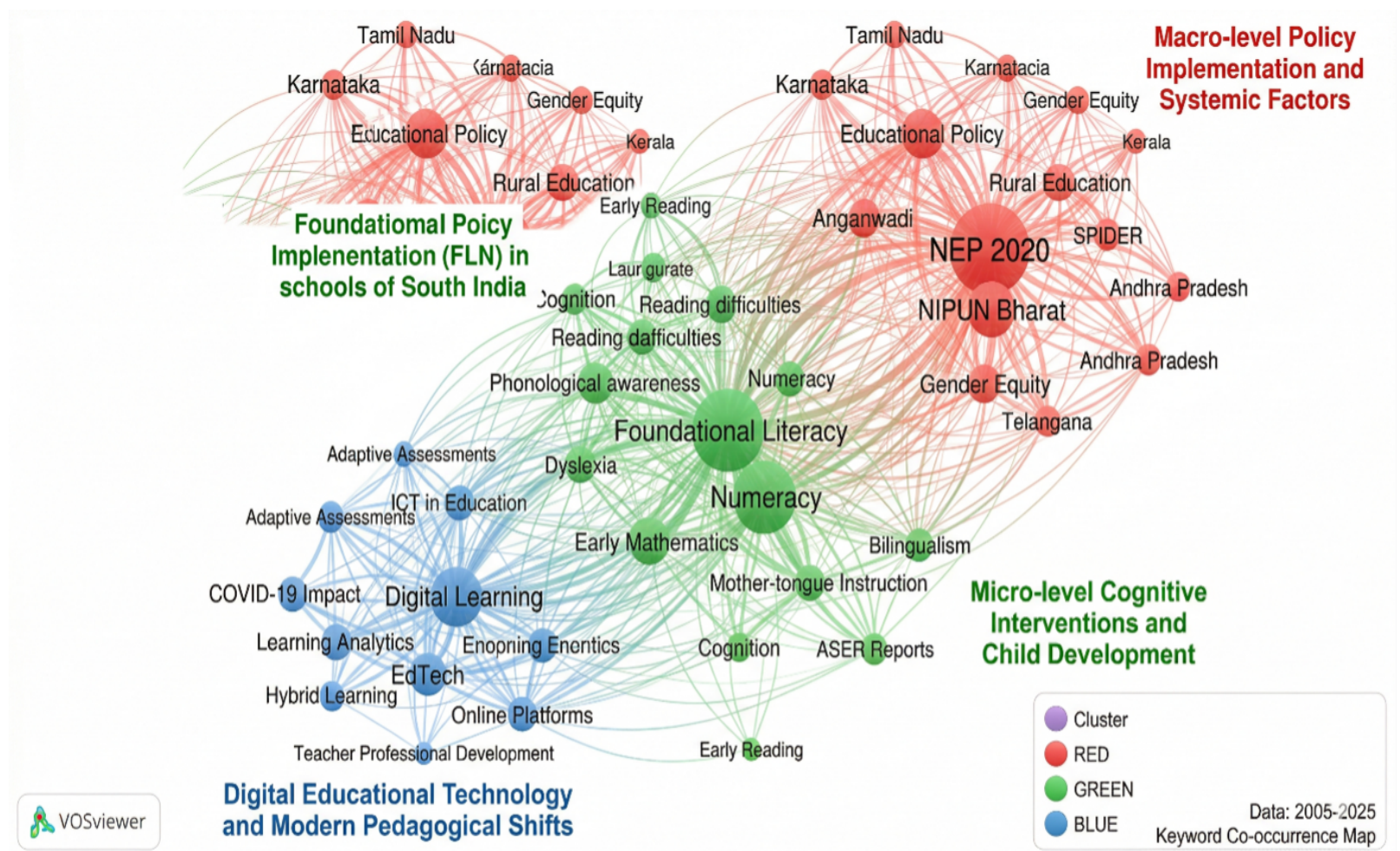
4.3 Results: Science Mapping and Thematic Clusters (VOS viewer)

The complex conceptual framework of the discipline was mapped by a keyword co-occurrence analysis (with a 5-words minimum frequency cutoff to remove statistical noise). The VOS viewer modularity algorithm was able to find three highly integrated, discrete thematic clusters each of which represented one of the main pillars of current research in educational fields in Telangana.

Table 4: Prolific Contributing Institutions and Regional Universities

Institution / Affiliation	Location	Documents (n)	Institutional Focus & Role
SCERT Telangana	Hyderabad	38	State curriculum design; teacher manual publishing; <i>Tholimettu</i> execution.
Osmania University	Hyderabad	32	Foundational pedagogical research; teacher education assessments.
English and Foreign Languages Univ. (EFLU)	Hyderabad	28	ESL primary transitions; bilingualism; socio-linguistic classroom impact.
Tata Institute of Social Sciences (TISS)	Hyderabad	22	Educational equity; tribal schooling; marginalized community access.
National Institute of Edu. Planning & Admin. (NIEPA)	New Delhi	18	Federal policy alignment; educational administration; macro-governance.

Figure 3: VOS viewer Keyword Co-occurrence Network. Node size reflects the frequency of keyword occurrence; link thickness indicates the strength of the bibliometric coupling. The distance between nodes represents conceptual similarity.



4.4 Cluster 1: Macro-level Policy, Inclusive Education, and Community Engagement (Red Nodes)

This is the greatest and the most basic cluster on the network. It is focused on high-frequency keywords like Tholimettu, NEP 2020, NIPUN Bharat, inclusive education, rural schools, tribal education, Anganwadi integration and School Management Committees (SMCs).

Theoretical Analysis: The study in this group works at the macro-systemic level, questioning the manner in which federal and state policies are transformed into local action. Another important literature in this area is concerned with the democratization of education and social justice. Historians often analyse infrastructural realities of the Mana Ooru-Mana Badi project in marginalized districts.

More importantly, this cluster indicates the scholarly interest in early childhood care and education (ECCE) (Gyekye-Ampofo et al., 2023). There is a considerable amount of studies in assessing how well the state is trying to integrate the Anganwadi centres (rural child care) and the formal primary schools to provide a smooth cognitive transition (Sriprakash et al., 2023). More so, the presence of such keywords as community service and SMCs means that a serious research was carried out on the role of localized parental engagement and community social work as a crucial measure to implement accountability and decrease the number of dropout cases among risky demographic groups in rural Telangana.

4.5 Cluster 2: Micro-level Cognitive Interventions and Socio-Linguistic Realities (Green Nodes)

This group of inquiry cuts down to the actual pedagogical machismo taking place within the classroom. Keywords such as oral reading fluency (ORF), phonological awareness, early mathematics, mother-tongue instruction, bilingualism, translanguaging and learning loss prevail.

Theoretical Analysis: This group is the psychological and cognitive aspects of FLN. Since Telangana has a unique linguistic culture, a colossal portion of the literature measures the tension and complements between Telugu (state language), Uri, tribal languages (e.g., Gondi), and the growing governmental policy requiring every student to use English, starting in Class 1. Additionally, out-of-school factors such as supplementary private tutoring play a notable role in shaping foundational learning outcomes in rural regions (Dongre & Tewary, 2015).

Popular articles in this group consider the exact cognitive standards developed by the state (e.g., whether Class 2 students are able to read 30 words per minute fluently). Scholars examine the effectiveness of translanguaging pedagogies, in which the instructors go to the deliberate use of the mother tongue of the student to form an understanding in a second language (Kumar Yadav, 2014). Also, the current cluster manages the extensive post-pandemic literature assessing remedial cognitive interventions aimed at restoring the simple arithmetic skills lost in a longer school closure (Fuchs et al., 2023).

4.6 Cluster 3: Technology Integration and Digital Monitoring Systems (Blue Nodes)

It is the fastest growing and the new cluster within the network. Such keywords characterize it as educational technology (EdTech), digital monitoring, spot assessment, artificial intelligence in education, supportive supervision, cluster nodal officers, and learning analytics.

Theoretical Analysis: This cluster plots the deep-rooted implementation of technology in the management and provision of primary education in Telangana. As opposed to the historical EdTech research, which only considered students on computers, the literature here pays much attention on administrative and pedagogical monitoring (Regan & Jesse, 2018).

One of such topics of the study is the Master App of the state and the computerization of the inspection procedure. Researchers examine the use of digital tablets by Cluster Nodal Officer and Mandal Educational Officer to conduct spot assessment of student learning and teacher performance in real-time and randomly. The literature estimates the effectiveness of these predictive learning analytics in finding the underperforming schools and allocating specific continuous professional development (CPD) resources (Qazi & Pachler, 2025). Moreover, this cluster deals with the implementation of AI and disruptive technologies to the development of adaptive learning resources and the reduction of the digital gap between private institutions in Hyderabad and the state-owned schools in rural areas.

Table 5: Detailed Breakdown of VOS viewer Thematic Clusters and Keyword Nodes

Cluster Identifier	Dominant Keyword Nodes	Weight Freq. /	Central Epistemological Focus
Cluster 1: Policy & Inclusion (Red)	NEP 2020; <i>Tholimettu</i> ; NIPUN Bharat; Inclusive Education; <i>Anganwadi</i> ; SMCs; Rural Schools.	High (42%)	Top-down governance; structural equity; ECCE integration; community-led accountability.
Cluster 2: Cognitive & Linguistic (Green)	Oral Reading Fluency (ORF); Phonological Awareness; Early Math; Translanguaging; Mother-Tongue.	Medium (33%)	Classroom cognitive scaffolding; vernacular vs. English-medium friction; learning loss remediation.
Cluster 3: Digital Monitoring (Blue)	EdTech; Digital Dashboards; Spot Assessments; Learning Analytics; Supportive Supervision; AI.	Emerging (25%)	Inspection computerization; real-time tracking; CPD allocation; administrative oversight.

5 Discussion

The bibliometric data used in this paper proves that the study of FLN in Telangana has ceased to be a marginalized niche research topic and become the main focus of the modern research in educational policy. This development is part of a more general, worldwide, epistemological change: the discovery that enrolling and not learning is a vain triumph.

5.1 The "Tholimettu" Model as a Scalable Framework

The amount of literature published on the topic of the Tholimettu program since 2022 indicates that the academic community considers the method of Telangana to be one of the most important, which can be expanded to the Global South. The program, based on the high structure of pedagogy, which gives teachers day-by-day, 140-day micro-plans, is a solution to the historic issue of the uneven capacity of teachers in rural society. According to the bibliometric data, researchers are also busy analyzing whether this movement toward scripted teaching provides faster cognitive learning of the foundational literacy than the more traditional, autonomous teaching methods. This structured, target-driven pedagogical framework builds upon prior nationwide attempts to scale foundational learning programs across primary schools in India ([Banerji & Chavan, 2016](#)).

5.2 The Friction Between Standardization and Contextualization

A critical review of Clusters 1 and 2 shows that there is a current dilemma in the literature. Although macro-policies (**Cluster 1**) may require standardized testing and digital tracking at the state-wide level, the socio-linguistic specificities of the classrooms (**Cluster 2**) require the highly contextualized and flexible pedagogy. Studies have emphasized the effect of imposing standardised instructions in teaching Telugu/English languages on the first generation learners in the tribal community of the districts such as Bhadradri Kothagudem. The literature raises the question that in the inclusive education process, decentralization of pedagogical material is necessary to embrace local dialects and cultural background, which can only be achieved through the reforms of the top-down system.

5.3 The Double-Edged Sword of Digital Accountability

The fast development of Cluster 3 brings to the fore a very vital discussion on educational technology. Telangana has been the first to use digital applications in supportive supervision. As literature notes that real-time data analytics are a radical way to enhance accountability in administration and resource distribution, various important studies warn about excessive monitoring of teachers (hyper-surveillance). The scholarly literature cautions against the use of spot assessment as merely a punitive mechanism of administration, as opposed to a pedagogical resource, as it can have a disastrous effect on teacher morale and kill classroom creativity. The next stage of technological integrations needs to strike a balance between data collection and actual professional empowerment. While real-time digital monitoring increases governance efficiency, technology-aided instruction in Indian classrooms must be designed to adaptively target individual learning levels rather than solely serving administrative oversight ([Muralidharan et al., 2019](#)).

5.4 Limitations, and Future Directions

The research is the first multi-decade, multi-faceted bibliometric mapping of Foundational Literacy and Numeracy research placed into a specific dynamic environment of the State of Telangana. The scientometric analysis visualizes an area of research that has already grown and shifted towards macro-level socio-economic criticisms of access to high-level, data-based assessments of cognitive standards, systematized pedagogy, and computerized responsibility.

5.4.1 Limitations

Although this research offers a strong macro-overview, it is susceptible to the usual bibliometric shortcomings. Utilizing the Scopus database, which will guarantee high academic excellence, will inevitably omit useful regional literature, state government white papers, NGO reports, and pedagogical studies published in non-indexed journals in vernacular (Telugu).

5.4.2 The thematic mapping of space shows the clear white areas and the emergency demands to the future academic agenda:

- **Longitudinal Efficacy of the 5+1 Model:** Multi-year longitudinal studies that follow one group of students (Class 1 through Class 5) would be critically needed to determine whether the Tholimettu structured assessment model would result in long-term permanence of literacy retention or rote memorization to implement spot assessments.
- **Efficacy of Vernacular EdTech:** In the era of ubiquitous digital technologies, scholars need to do rigorous Research-based Controlled Trials (RCTs) to determine whether AI-based, adaptive educational technology can truly make fundamental numeracy better when used in rural, resource-constrained settings, or whether it will further widen disparities.
- **Pre-Service Teacher Education:** There is a glaring gap in the existing literature that the post-service teacher training (B.Ed/D.El.Ed curriculums) is in line with the new realities of the NEP 2020. The next round of research will be required to assess the effectiveness of teacher training institutes in Telangana to prepare teachers to support complex bilingual transitions and use learning analytics in the real-time.

By focusing on the mentioned frontiers, educational researchers, policymakers, and civil stakeholders will be able to envision that the ambitious, data-driven goals of the state government can be converted into equitable, high-quality, and sustained foundational learning to all children in Telangana.

6 Conclusion

The paper will be the first multi-decade bibliometric mapping of Foundational Literacy and Numeracy (FLN) research based on the particular context of dynamic Telangana State. The scientometric analysis represents a field of research that has developed fast and shifted towards a micro level of socio-economic critique of schooling access to a highly specific, data-driven measurement of cognitive standards, structured pedagogy, and online accountability.

The literature boom that has taken place since 2021 underlines the fact that there has been a paradigm shift that has been fuelled by the National Education Policy (NEP) 2020 and the state-led Tholimettu initiative. Telangana has become an important laboratory of educational change in the Global South by changing the pedagogical emphasis on enrolment to quantifiable cognitive outcomes. The identified thematic clustering in this paper, including both the inclusive community engagement and the micro-based bilingual interventions and predictive learning analytics, can be considered a demonstration of how very complicated the operationalization of foundational learning can be at scale.

Nevertheless, the tension is also critical in the literature that brings out the standardization needed to monitor state-wide and localization needed to provide an inclusive education. Though digital tools and organized 140-day micro-plans contribute to making the system more accountable, they should not override the situational freedom of the teacher especially in rural and tribal linguistic regions. Finally, achieving the ultimate goal of universal foundational literacy in Telangana is not only possible with a strict tracking system, but is also based on the empowerment of teachers to provide meaningful, linguistically responsive learning experiences. The ongoing, fair, and localized academic inquiry should be the initiative application behind the educational policies of the state as it proceeds.

7 Conflict of Interest

The authors declare no competing financial or personal interests. Acknowledging that the corresponding author, Dr. Shankar Paripally, is an active member of the Editorial Board of the Bharat Journal of Integrated Knowledge Systems, he was completely blinded and entirely recused from the peer-review, editorial evaluation, and decision-making pipeline for this manuscript to maintain the highest standard of academic integrity.

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9 Authors' Contribution

Dr. Shankar Paripally (SP) and Deepathi Sayam (DS): Data collection, research design, conceptualization, methodology, and interpretation.

10 AI Declaration

Artificial intelligence tools were not used for conceptual framing, analysis, or interpretation of this study. AI assistance was limited to grammar and typographical checking, and to generating figures and images relevant to the data and study.

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