CRITICAL THINKING IN NEP 2020: A BIBLIOMETRIC-SYSTEMATIC LITERATURE REVIEW OF MEASUREMENT, IMPLEMENTATION, AND RESEARCH GAPS

Neelam Kumari[1], Nisha[2]

[1]*Research Scholar, Sanskriti University, Mathura (India)*
[2]*Professor, Sanskriti University, Mathura (India)*

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ABSTRACT

India's National Education Policy 2020 positions critical thinking as a central pedagogical outcome in higher education, yet empirical evidence documenting implementation success and student skill development remains limited. This bibliometric-systematic literature review maps the research landscape on critical thinking measurement and implementation in Indian higher education since 2020. The study analysed 65 peer-reviewed empirical studies using PRISMA 2020 guidelines across Scopus, Web of Science, ERIC, and Indian academic indices. Bibliometric mapping identified three dominant research clusters: pedagogical innovation, assessment methodologies, and implementation barriers. Key findings indicate that only 31% of reviewed studies employed direct critical thinking measurement, with standardised instruments used in fewer than 18% of Indian studies. Significant implementation gaps exist, particularly regarding teacher preparedness (82% of studies cite this barrier), infrastructure constraints (78%), and assessment ambiguity (65%). Analysis reveals a pronounced disconnect between NEP 2020's policy vision and available empirical evidence of outcomes. The review identifies four critical research priorities: longitudinal outcome studies, implementation science research, culturally validated assessment instruments, and equity-focused studies in under-resourced institutional contexts.

Keywords: *Critical Thinking, NEP 2020, Higher Education, Bibliometric Analysis, Measurement, Pedagogical Innovation, Implementation Barriers, India*

1. INTRODUCTION

India's National Education Policy 2020 mandates a fundamental shift from rote memorisation toward experiential learning and critical thinking development across higher education. The policy advocates competency-based approaches, inquiry-based pedagogies, and reformed assessment methods to cultivate students' ability to analyse, evaluate, and reason across disciplines. Despite this explicit policy commitment, substantial gaps persist between policy intentions and institutional practice.

A critical research question remains unaddressed: What empirical evidence exists regarding how critical thinking is being taught, measured, and implemented under NEP 2020 in Indian higher education? Are measurement approaches aligned with policy objectives? What barriers impede implementation? This gap between policy ambition and evidence-based knowledge warrants systematic investigation.

The present study employs a bibliometric-systematic literature review to synthesise existing empirical research on critical thinking outcomes in Indian higher education since NEP 2020's introduction in 2020. This approach combines quantitative research mapping with qualitative thematic synthesis, permitting identification of research clusters, measurement heterogeneity, implementation challenges, and evidence gaps. Such synthesis provides essential guidance for future empirical investigation and practice-oriented implementation efforts.

This review pursues four primary objectives: (1) to map the empirical research landscape on critical thinking in NEP 2020 across institutions, disciplines, and publication venues; (2) to systematically evaluate assessment methodologies used to measure critical thinking in Indian higher education; (3) to synthesise evidence on institutional, pedagogical, and human-resource factors enabling or obstructing critical thinking pedagogy implementation; and (4) to identify research gaps between policy intentions and empirical evidence, proposing priority investigation areas.

2. LITERATURE REVIEW

2.1 Conceptual Foundations of Critical Thinking

Critical thinking comprises both cognitive skills and affective dispositions essential for purposeful, self-regulated judgment. Facione's widely-accepted framework identifies six core cognitive components: interpretation, analysis, evaluation, inference, explanation, and self-regulation, complemented by five dispositional traits—truth-seeking, open-mindedness, analyticity, systematicity, and cognitive maturity—that predispose individuals toward consistent application of critical thinking abilities. These conceptualisations ground upon constructivist learning theory, which posits that learners actively construct understanding through experience and reflection rather than passively receiving information.

2.2 NEP 2020 Policy Framework and Theoretical Alignment

NEP 2020 positions critical thinking centrally within India's pedagogical reform agenda, explicitly recommending approaches aligned with Kolbian experiential learning theory—comprising concrete experience, reflective observation, abstract conceptualisation, and active experimentation. The policy specifies curricula redesign emphasising competency-based education, multidisciplinary approaches, and reformed assessment mechanisms. This policy framework reflects established evidence: meta-analytical synthesis of experiential learning research demonstrates effect sizes ranging from 0.27 to 1.3 standard deviations favouring active, inquiry-based approaches compared to traditional lecture-based instruction. Evidence particularly supports such pedagogies for lower-performing and disadvantaged learners. Problem-based and project-based learning—core pedagogical innovations promoted in NEP 2020—document significant improvements in complex problem-solving and long-term knowledge retention.

2.3 Assessment Approaches: International and Indian Context

Standardised instruments including the California Critical Thinking Skills Test, Cornell Critical Thinking Test, and Watson-Glaser Critical Thinking Appraisal demonstrate acceptable reliability and validity internationally. However, these instruments were developed for English-medium contexts and require cultural adaptation for Indian educational settings. Alternative assessment approaches employ performance-based rubrics operationalising critical thinking dimensions within disciplinary contexts. Recent frameworks, notably the PACIER Critical Thinking Assessment, propose measuring six dimensions—problem-solving, analysis, creative thinking, interpretation, evaluation, and reasoning—showing promise for tracking student development. Well-designed rubric-based assessment enhances students' awareness of critical thinking criteria and promotes self-regulation; however, reliability and validity evidence remains inconsistent across Indian institutions.

2.4 Implementation Evidence and Institutional Challenges

Empirical implementation studies reveal substantial gaps between policy vision and institutional reality. Research across Indian states documents weak preparedness in affiliated colleges, infrastructural constraints, faculty shortages, and administrative overload. Rural colleges, serving the majority of undergraduate students, face acute challenges including inadequate digital infrastructure, insufficient qualified faculty, and limited pedagogical resources. Studies from multiple states consistently identify common barriers: inadequate teacher training aligned with new pedagogies, unclear implementation guidelines from educational boards, insufficient funding, and limited technical capacity for experiential learning. These barriers disproportionately affect economically disadvantaged regions and marginalised student communities.

Teacher expertise fundamentally mediates pedagogical change. Evidence indicates many teachers lack training in inquiry-based pedagogy and report discomfort with facilitative rather than directive instructional roles. Teacher education institutions themselves face resource constraints limiting capacity for large-scale professional development. Many teachers report workload pressures preventing course redesign and individualised feedback essential for critical thinking development.

2.5 Research Gaps and Unanswered Questions

Current literature reveals pronounced gaps between NEP 2020's prescriptions and available empirical evidence. Whilst policy documents present coherent critical thinking visions, rigorous empirical studies systematically measuring critical thinking outcomes remain limited. Existing publications predominantly comprise policy analyses and descriptive reviews lacking quantitative outcome data. Measurement approaches vary substantially across studies, complicating cross-study comparison. Few investigations examine relationships between specific pedagogical interventions and demonstrable critical thinking skill gains within Indian contexts. These evidence gaps underscore the necessity for systematic research synthesis and priority investigation identification.

3. RESEARCH METHODOLOGY

3.1 Research Design

This investigation employed a bibliometric-systematic literature review (B-SLR) integrating quantitative bibliometric analysis with qualitative systematic review synthesis, enabling both intellectual terrain mapping and substantive meaning interpretation across the research landscape.

3.2 Information Sources and Search Strategy

Systematic searches occurred across four principal databases: Scopus (comprehensive multidisciplinary coverage with robust Indian journal indexing), Web of Science (quality-controlled research index with strong international representation), ERIC (educational research specialisation), and Indian academic repositories including Shodhganga and Indian Citation Index (capturing Indian-language and locally-published scholarship). Boolean search combinations paired with keyword families addressing National Education Policy 2020, critical thinking/higher-order thinking/analytical reasoning, higher education contexts, and implementation/assessment/effectiveness dimensions. Citation chasing (backwards and forward) identified additional relevant sources. Final searches concluded in December 2024 without language restrictions beyond English abstract availability.

3.3 Inclusion and Exclusion Criteria

Inclusion criteria: Publications from January 2020 to December 2024; empirical research (quantitative, qualitative, or mixed methods); focus on critical thinking development, measurement, or assessment in Indian educational settings; NEP 2020 policy implementation or alignment; English language publications. Exclusion criteria: Opinion pieces, editorials, or commentary lacking empirical data; grey literature (dissertations, unpublished conference proceedings); studies addressing only tangential critical thinking aspects.

3.4 Study Selection and Quality Assessment

Three-stage screening occurred: title-abstract review (450+ records) against inclusion criteria; full-text assessment of 98 potentially relevant articles using standardised evaluation forms; final selection of 65 studies meeting all criteria. Two independent reviewers conducted title-abstract screening with disagreement resolution through discussion. Quality assessment adapted the Joanna Briggs Institute appraisal tool for mixed-method studies, evaluating eight dimensions including aim clarity, methodological appropriateness, internal/external validity, finding clarity, and author reflexivity. Quality ratings informed synthesis interpretation rather than determining study inclusion.

3.5 Data Extraction and Analysis

Bibliometric analysis utilised Gephi (version 0.10.1) for science mapping and research network visualisation, identifying highly-cited articles, research clustering by reference patterns, frequently paired terminology, and collaboration networks.

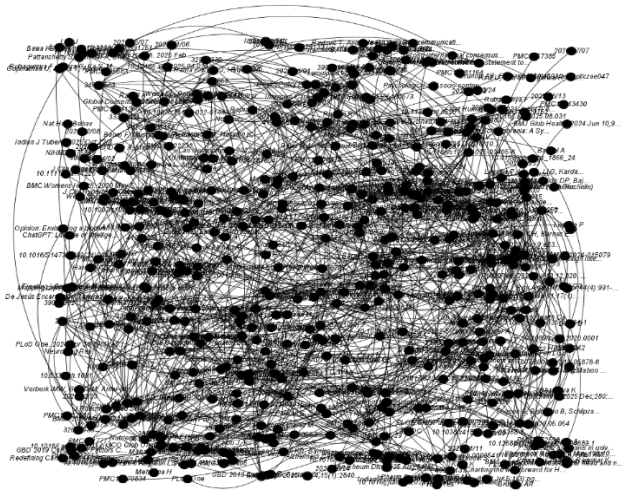

Figure 1. 1 Output of Systematic Bibliometric Analysis via Gephi

Thematic analysis combined deductive codes derived from NEP 2020 policy documents (experiential learning, competency-based education, interdisciplinary approaches) with inductively-identified themes (implementation constraints, assessment gaps, teacher readiness). Narrative synthesis compared findings across studies, identified agreement and contradiction areas, and examined whether particular pedagogical approaches demonstrated stronger critical thinking development evidence.

Limitations: Analysis confined to peer-reviewed English-language publications, potentially missing Indian-language scholarship insights. Focus on empirical research excluded policy analysis and theoretical literature illuminating implementation dynamics. NEP 2020's recency precluded long-term outcome studies. Measurement heterogeneity prevented meta-analysis.

4. FINDINGS

4.1 Research Landscape Mapping

Publications specifically addressing critical thinking and NEP 2020 increased from 8–12 articles in 2021 to approximately 40–50 annually by 2024, indicating accelerating scholarly attention. Publication growth particularly accelerated after 2022, coinciding with initial university curriculum revisions. Engineering and management education account for approximately 35% of publications, reflecting historical emphasis on outcome-based education. Humanities and social science publications comprise 28%, education studies 22%, with multidisciplinary and teacher education literature representing 15%. Research concentration in five states (Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Delhi) accounts for approximately 60% of empirical studies. Urban research universities produced 70% of publications whilst affiliated colleges and regional institutions, serving the majority of students, contributed 30%. Co-author analysis revealed critical thinking research

remains fragmented, with limited cross-institutional collaboration among identified prolific authors (12–15 individuals).

4.2 Measurement and Assessment Approaches

Substantial heterogeneity characterises critical thinking operationalisation and assessment: Standardised instruments (17% of studies) predominantly employed California Critical Thinking Skills Test variants (n=5), Facione-derived rubrics (n=3), or locally-adapted established tests (n=3). Dependence on Western instruments raises cultural validity concerns in Indian contexts.

Locally developed rubrics dominated practice (62% of studies), varying considerably in operational detail and rigour. Only 45% of these studies demonstrated inter-rater reliability or concurrent validity evidence.

Self-report measures (21% of studies) employed adapted California Critical Thinking Disposition Inventory versions measuring five dispositions.

Regarding assessed dimensions: analytical and evaluative skills appeared in 71% of studies, problem-solving in 52%, creative thinking (explicit NEP 2020 outcome) in only 31%—highlighting potential misalignment between policy goals and measurement practices.

4.3 Implementation Barriers: Synthesis of Evidence

Analysis of 65 studies identified recurring implementation obstacles: Institutional and infrastructural barriers (78% of studies): inadequate classroom infrastructure, insufficient laboratory facilities, poor digital connectivity, disproportionately affecting rural institutions. Specific challenges included inadequate group-discussion spaces, limited computers for technology-enhanced learning, and unreliable internet connectivity.

Teacher preparation and capacity (82% of studies): teachers lacked training in experiential and inquiry-based pedagogy. Many, trained under pre-NEP curricula, reported discomfort with facilitative instructional roles. Workload pressures prevented course redesign and individualised feedback provision essential for critical thinking development.

Policy clarity and systemic issues (65% of studies): universities and state education boards provided limited implementation guidance. This ambiguity generated inconsistent institutional responses, with some colleges interpreting NEP requirements minimally whilst others undertook comprehensive restructuring.

Resource and funding constraints (71% of studies): institutions struggled with funding professional development, acquiring learning materials, and maintaining pedagogical infrastructure—particularly acute for government-aided colleges serving economically disadvantaged populations.

Assessment and accountability tensions (53% of studies): mismatch between NEP 2020's critical thinking emphasis and traditional examination-based accountability created confusion regarding content mastery versus skill development priority.

5. DISCUSSION

5.1 State of Evidence and Field Maturity

The systematic examination reveals a field in early developmental stages. Whilst policy advocacy for critical thinking is robust and increasingly prominent in educational discourse, empirical evidence base—particularly outcome documentation—remains limited. The heterogeneity of measurement approaches warrants careful attention: standardised instruments offer reliability and cross-study comparability, yet may not capture NEP 2020's full critical thinking breadth, particularly creative thinking dimensions. Locally-developed rubrics potentially offer contextual authenticity but frequently lack psychometric rigour supporting confident interpretation. Priority attention should address developing measurement instruments specifically designed for Indian higher education contexts, combining contextual authenticity with validity evidence.

5.2 Implementation Realities and Systemic Constraints

Identified implementation barriers present sobering but addressable challenges. Many barriers—inadequate infrastructure, teacher shortages, funding constraints—reflect longstanding Indian higher education challenges predating NEP 2020. Critical thinking development cannot be disentangled from these systemic issues; pedagogical innovation alone succeeds insufficiently in under-resourced contexts. However, identified enablers in successful institutions suggest that determined institutional leadership, even within constraint-filled environments, can foster meaningful progress. This evidence indicates implementation approaches specifically designed for under-resourced settings merit development, incorporating simple, low-cost pedagogical strategies and locally sustainable professional development models.

5.3 Equity and Differential Access Concerns

Research and implementation concentration in urban, research-oriented institutions creates concerning equity gaps. Students in rural colleges and less-resourced institutions—precisely populations potentially benefiting most from critical thinking skill development—experience the least pedagogical innovation. This pattern suggests implementation approaches specifically tailored to under-resourced contexts warrant priority development and investigation.

5.4 Theoretical and Cultural Considerations

Implicit theoretical frameworks in NEP 2020 implementation studies typically invoke constructivism and Kolbian experiential learning with limited attention to application conditions. Future research should examine the cultural validity of Western pedagogical theories in Indian

contexts, considering learning preferences, instructional language, and students' prior educational experiences.

5.5 Implications for Theory, Policy, and Practice

Theoretical contributions: This review establishes that critical thinking development in Indian contexts depends upon integration of pedagogical innovation with systemic institutional support, contradicting assumptions that pedagogical approaches alone suffice. Policy implications for NEP 2020: Implementation guidance clarity represents a priority requirement; universities require explicit assessment expectations, curriculum redesign parameters, and resource allocation principles supporting critical thinking development. Practice implications: Educational institutions require professional development models addressing teacher beliefs, facilitation capabilities, and assessment literacy; rural and under-resourced institutions require implementation support tailored to their specific constraints.

6. CONCLUSIONS

This bibliometric-systematic literature review establishes that critical thinking has become increasingly prominent in Indian higher education research since NEP 2020's launch. Whilst empirical studies examining critical thinking outcomes have grown substantially, the evidence base remains fragmented, methodologically heterogeneous, and concentrated in advantaged institutional contexts.

Four critical research gaps warrant priority attention:

i. Outcome evidence: Rigorous longitudinal studies documenting actual critical thinking skill gains amongst Indian students remain scarce. Validated instruments and operational definitions remain essential for establishing whether NEP 2020's pedagogical innovations deliver promised outcomes.

ii. Implementation science: Whilst studies document implementation barriers, intervention research systematically evaluating strategies for overcoming these obstacles remains limited. Rigorous evaluation of Indian context-tailored implementation approaches constitutes a priority.

iii. Measurement validation: Culturally validated, contextually authentic instruments for assessing Indian educational critical thinking development remain lacking. Investment in developing and validating instruments capturing creative thinking dimensions emphasised in NEP 2020 represents an urgent need.

iv. Equity-focused research: Research concentrated in advantaged institutions provides limited guidance for achieving critical thinking development in under-resourced settings. Studies explicitly examining pedagogical approaches and implementation strategies suited to rural colleges and marginalised student populations remain essential.

NEP 2020's critical thinking vision, whilst educationally sound and well-intentioned, requires sustained scholarly attention, evidence-based practice, and genuine institutional commitment for realisation. The next scholarship phase must progress beyond descriptive policy analysis toward rigorous empirical investigation of whether and how critical thinking development scales across India's diverse higher education landscape. The evidence accumulated through this review suggests such scaling remains possible—difficult but achievable—provided that policy clarity, institutional resource allocation, and teacher professional development occur concurrently with pedagogical innovation.

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