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Information Literacy Research Trends in the Last Two Decades: A Bibliometric Analysis and Future Outlook

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Abstract

This study analyzes global research trends in Information Literacy (IL) from 2000 to 2025 using bibliometric and thematic analysis of 1,243 studies retrieved from Scopus and Web of Science. The findings reveal an annual growth rate of 7.8%, with research activity peaking in 2021. Six thematic clusters were identified, illustrating the evolution of IL from basic search and retrieval skills toward emerging areas such as Artificial Intelligence (AI) and algorithmic literacy. Across the maturity dimensions, skill-based literacy scored the highest globally, while algorithmic literacy remained the least developed. The study proposes an Integrated AI–IL Framework that combines the ACRL Framework and the UNESCO Media and Information Literacy (MIL) model, introducing a new algorithmic awareness dimension. Furthermore, it identifies three significant research gaps: trust in AI outputs, AI attribution standards, and integration of IL with data governance frameworks. Overall, the findings demonstrate that Information Literacy has transformed from a purely technical skill set into a cognitive–ethical–algorithmic system, essential for education, research integrity, and institutional data policy development.

Keywords: Information Literacy, UNESCO MIL, ACRL Framework, Bibliometric Analysis, Algorithmic Literacy, Generative AI.

Introduction

Over the past two decades, information literacy (IL) has undergone a substantial conceptual transformation. Initially framed as a set of technical competencies related to locating, retrieving, and using information, IL has progressively evolved into a multidimensional practice encompassing cognitive, social, and ethical dimensions of knowledge production. This evolution has been accelerated by digital transformation, the expansion of online learning environments, and the increasing mediation of information through algorithmic and artificial intelligence–driven systems (Limberg et al., 2012; Lloyd, 2021).

Although information literacy has been the subject of sustained scholarly attention since the early 2000s, the resulting body of literature remains theoretically fragmented. Previous studies have documented publication growth, dominant research themes, and educational applications, often through bibliometric or systematic review approaches (Pinto et al., 2020). However, much of this

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work treats information literacy as a relatively stable construct, offering limited insight into its epistemic transformation in response to artificial intelligence, algorithmic filtering, and emerging ethical concerns in digital knowledge environments (Andretta, 2020; Guzmán-Simón et al., 2023).

Concurrently, international policy and professional frameworks have redefined the scope of information literacy. The ACRL Framework for Information Literacy for Higher Education (2015) shifted the field away from skills-based standards toward threshold concepts emphasizing authority, process, and scholarly conversation. More recently, UNESCO's Media and Information Literacy (MIL) Framework (2023) expanded the concept further by integrating media literacy, digital citizenship, ethical participation, and social responsibility. Despite their conceptual convergence, empirical research examining the relationship between these frameworks over time remains limited, particularly from a large-scale longitudinal perspective (Association of College and Research Libraries, 2015; UNESCO, 2023).

Against this backdrop, this study addresses a critical gap by providing a bibliometric–thematic analysis of global information literacy research published between 2000 and 2025. Drawing on 1,243 publications indexed in Scopus and Web of Science, the study moves beyond descriptive trend mapping to reconstruct the intellectual evolution of information literacy across distinct developmental phases. By systematically aligning thematic trajectories with the ACRL and UNESCO MIL frameworks, the study reconceptualizes information literacy as a socio-algorithmic epistemic system shaped by technical competencies, cognitive practices, ethical reasoning, and algorithmic awareness (Floridi, 2013; Noble, 2018).

In doing so, the study responds to recent calls within library and information science for theory-building research capable of explaining conceptual change in information literacy rather than merely documenting research output. It positions information literacy at the intersection of information behavior, digital ethics, and artificial intelligence, and proposes an integrative model that captures its emerging role in AI-mediated knowledge production and evaluation (Broussard, 2018; Floridi and Cows, 2021).

Literature Review

Research on Information Literacy (IL) has expanded considerably over the last two decades, reflecting the growing importance of information-related competencies in educational, professional, and digital environments. Previous studies have examined the development of the field from different perspectives, including bibliometric analyses, conceptual discussions, educational applications, and emerging digital challenges.

One of the most comprehensive bibliometric studies was conducted by Pinto et al. (2020), who analyzed publication trends in Information Literacy research between 2000 and 2019. Their findings revealed continuous growth in scholarly output, increasing international collaboration, and the emergence of new thematic areas. However, their analysis primarily focused on productivity indicators and citation patterns, providing limited insight into the conceptual evolution of the field.

Andretta (2020) examined the relationship between Information Literacy and critical thinking, emphasizing the transition from skills-based approaches toward more reflective and socially situated perspectives. The study highlighted the importance of critical evaluation and contextual understanding but did not investigate large-scale research trends or thematic transformations over time.

Similarly, Lloyd (2021) described the “social turn” in Information Literacy, arguing that information practices are shaped by social, cultural, and contextual factors rather than individual skills alone. While this perspective contributed significantly to theoretical development, it focused primarily on conceptual interpretation rather than empirical mapping of global research developments.

More recently, Guzmán-Simón et al. (2023) explored the challenges posed by artificial intelligence and digital technologies for Information Literacy, particularly regarding the critical evaluation of AI-generated information. Their work highlighted emerging concerns related to trust, credibility, and digital ethics, yet it did not provide a longitudinal analysis of how these themes have evolved across the broader scholarly literature.

In parallel, studies on AI Literacy and Algorithmic Literacy have gained increasing attention. Long and Magerko (2020) proposed a framework for AI literacy competencies, while Ng et al. (2021) emphasized the importance of preparing learners for AI-mediated environments through critical engagement with intelligent systems. These studies demonstrate the growing convergence between Information Literacy, digital literacy, and artificial intelligence; however, they remain largely focused on competency development rather than examining the overall evolution of Information Literacy research itself.

Research Gap

Although previous studies have provided valuable insights into publication trends, educational applications, theoretical developments, and emerging AI-related challenges, limited attention has been devoted to examining the long-term thematic and conceptual evolution of Information Literacy research from an integrated global perspective. Furthermore, existing research has rarely combined bibliometric and thematic analyses to investigate how Information Literacy has evolved in relation to artificial intelligence, algorithmic awareness, and digital knowledge governance while simultaneously interpreting these developments through internationally recognized frameworks such as the ACRL Framework (2015) and UNESCO’s Media and Information Literacy (MIL) Framework (2023). Accordingly, the present study seeks to address this gap by providing a comprehensive bibliometric–thematic analysis of Information Literacy research published between 2000 and 2025.

Research Problem

The rapid expansion of artificial intelligence, algorithmic systems, and data-driven digital environments has fundamentally transformed the ways in which information is created, accessed, evaluated, and used. These developments have raised new challenges for Information Literacy

research, particularly regarding algorithmic awareness, trust in AI-generated content, digital ethics, and data governance.

Although Information Literacy research has grown substantially worldwide over the past two decades, existing studies have largely focused on publication productivity, citation patterns, educational applications, and instructional practices. Consequently, limited attention has been devoted to understanding how the field has evolved conceptually in response to artificial intelligence and emerging digital information environments.

Furthermore, there remains insufficient knowledge regarding the thematic evolution of Information Literacy research, the theoretical and methodological approaches shaping the field, and the extent to which contemporary developments align with international frameworks such as the ACRL Framework for Information Literacy for Higher Education and UNESCO's Media and Information Literacy (MIL) Framework.

Accordingly, the research problem lies in the absence of a comprehensive bibliometric and thematic analysis that systematically examines the evolution of Information Literacy research between 2000 and 2025 and explores its emerging relationship with artificial intelligence, algorithmic literacy, and digital knowledge governance..

Research Questions

The study aims to address the lack of comprehensive analysis of global trends in information literacy research over the past two decades by formulating five questions that examine its temporal, thematic, and theoretical evolution within the context of digital transformation and artificial intelligence.

1. What are the temporal and bibliometric trends in information literacy research between 2000 and 2025 in terms of publication volume, contributing countries, journals, and leading authors?
2. What are the main themes addressed by academic studies on information literacy during this period?
3. What are the most frequently used research methodologies and theoretical frameworks in the study of information literacy?
4. How do the contents of these studies intersect with the *UNESCO Media and Information Literacy (MIL) Framework* and the *ACRL Framework for Information Literacy (2015)*?
5. What research gaps and future directions can be identified for information literacy studies in the age of artificial intelligence and digital transformation?

Significance of Study

The study holds significant scientific, practical, theoretical, and future value. Scientifically, it provides a comprehensive quantitative and qualitative analysis of two decades of information literacy research, enabling scholars to identify influential trends and methodologies. Practically, it informs the development of educational policies and training programs aligned with global frameworks such as UNESCO's Media and Information Literacy (MIL) and the ACRL Framework for Information Literacy. Theoretically, it bridges research trends and intellectual foundations by proposing an integrated model that links information literacy with artificial

intelligence and digital awareness. Looking ahead, it offers a knowledge map that highlights existing research gaps and guides future research priorities for the coming decade.

Objectives of the Study

1. To analyze the quantitative and qualitative trends of globally published research on information literacy over the past two decades.
2. "To identify the major and sub-themes most frequently addressed within the field.
3. To classify the research methodologies and theoretical frameworks employed in previous studies.
4. To align the analytical findings with the UNESCO Media and Information Literacy (MIL) Framework and the ACRL Framework for Information Literacy (2015) to develop a comprehensive theoretical vision of the concept's evolution.
5. Foresight of future research trends that can contribute to the development of the field.

Methodology

This study employed a mixed-methods research design integrating bibliometric analysis and thematic content analysis to investigate global trends in Information Literacy research published between 2000 and 2025.

Data Collection and Search Strategy

Data were retrieved from the Scopus and Web of Science Core Collection databases, selected due to their broad coverage of high-quality scholarly literature in Library and Information Science and related disciplines. A comprehensive search was conducted using combinations of the keywords "Information Literacy", "Information Competence", "Information Skills", and related terms appearing in titles, abstracts, and author keywords.

The search was limited to peer-reviewed journal articles, review papers, and conference proceedings published between January 2000 and December 2025. Non-scholarly publications, editorials, notes, book reviews, and duplicate records were excluded.

Screening and Corpus Construction

The initial search yielded 1,687 records from both databases. After removing duplicate records and applying the inclusion and exclusion criteria, 1,243 publications were retained for the final analysis. The screening process involved title, abstract, and metadata review to ensure relevance to the concept of Information Literacy. A PRISMA-based flow diagram was used to document the identification, screening, eligibility, and inclusion stages.

Bibliometric Analysis

Bibliometric analysis was conducted using Bibliometrix (R Package) and VOSviewer. These tools were employed to analyze:

- Annual publication growth.
- Citation patterns.
- Leading authors, journals, institutions, and countries.
- Co-authorship networks.

- Keyword co-occurrence networks.
- Thematic clusters and thematic evolution over time.

Network visualizations were generated using VOSviewer with minimum occurrence thresholds established for keywords and author collaborations to ensure meaningful cluster formation.

Thematic Analysis

To complement the bibliometric findings, a thematic content analysis was conducted on the retrieved literature. Titles, abstracts, author keywords, and selected full texts were examined to identify dominant research themes and emerging conceptual trends. The coding framework was developed iteratively through multiple rounds of analysis and refinement.

The identified themes were subsequently mapped against two major international frameworks: The ACRL Framework for Information Literacy for Higher Education (2015) . UNESCO's Media and Information Literacy (MIL) Framework (2023) .

This mapping enabled the interpretation of thematic developments within broader theoretical and policy contexts

Reliability and Validity

To enhance reliability, thematic coding was independently conducted by two coders. Inter-coder agreement was assessed using Cohen's Kappa coefficient, achieving a value of 0.80 or higher across all coding categories, indicating substantial agreement. Sensitivity checks were also performed to verify the stability of thematic classifications and clustering results.

Data Analysis

Descriptive and inferential analyses were performed using SPSS and Python to calculate publication growth rates, thematic frequencies, collaboration indicators, and comparative distributions across thematic categories and time periods.

Limitations

The study has several limitations. First, the analysis was restricted to publications indexed in Scopus and Web of Science, which may underrepresent research published in regional or non-indexed sources. Second, English-language publications constituted the majority of the dataset, potentially limiting the visibility of non-English scholarship. Third, the emerging concept of algorithmic literacy lacks universally accepted measurement standards, which may affect the interpretation of related thematic trends.

Second: The Theoretical Framework of the Study

Conceptual Evolution of Information Literacy

Information literacy (IL) has evolved from a skills-based approach focused on information access and retrieval into a multidimensional cognitive and social practice embedded within digital knowledge environments. Early definitions emphasized technical competencies related to information use, while later theoretical perspectives reframed IL as a contextual and socially situated practice involving critical interpretation, participation, and meaning making within communities of knowledge production (Zurkowski, 1974; Limberg et al., 2012; Lloyd, 2021).

International frameworks have played a central role in redefining information literacy. The

ACRL Framework for Information Literacy for Higher Education (2015) reconceptualized IL through threshold concepts such as authority, information creation, and scholarly conversation, moving the field beyond procedural skill acquisition. Similarly, UNESCO's Media and Information Literacy (MIL) Framework (2023) expanded the scope of IL by integrating media literacy, digital citizenship, and ethical participation, positioning information literacy as a dynamic epistemic practice shaped by cognitive, social, and ethical dimensions (ACRL, 2015; UNESCO, 2023).

From Technical Skills to Critical and Ethical Information Practices

The transformation of information literacy is particularly evident in the evolution of information search and evaluation practices. Activities once treated as technical operations have increasingly been reframed as higher-order cognitive processes involving critical judgment, contextual awareness, and reflective inquiry. Within the ACRL Framework (2015), research is conceptualized as strategic exploration, while authority is understood as constructed and contextual rather than inherent (Andretta, 2020; Walton & Hepworth, 2013; ACRL, 2015).

This conceptual shift has foregrounded the ethical dimension of information literacy. Beyond issues of citation and academic integrity, contemporary IL encompasses broader concerns related to information justice, transparency, and responsible participation in digital environments. As information ecosystems become increasingly mediated by platforms and automated systems, ethical reasoning and critical awareness have emerged as integral components of information literacy rather than supplementary skills (Floridi, 2013; Ribeiro, 2017; UNESCO, 2023).

Convergence of Information, Media, and Algorithmic Literacies

Digital transformation has accelerated the convergence of information literacy and media literacy, blurring traditional boundaries between information sources and media platforms. UNESCO's MIL Framework (2023) explicitly integrates access, evaluation, use, creation, and participation, aligning closely with the ACRL Framework's emphasis on inquiry and contextual authority. This convergence reflects the reality of contemporary information environments, where information and media circulate through shared digital infrastructures (ACRL, 2015; UNESCO, 2023).

Recent scholarship has extended this convergence to include algorithmic and data literacy. Understanding how algorithms shape information visibility, relevance, and bias has become essential for meaningful engagement with digital knowledge systems. Critical digital literacy perspectives emphasize the need to expose platform logic, data practices, and algorithmic power relations, supported by frameworks such as DigComp 2.2 (Pangrazio, 2016; Noble, 2018; D'Ignazio & Klein, 2020; European Commission, 2022).

Artificial Intelligence and New Forms of Information Literacy

The emergence of artificial intelligence, particularly generative AI systems, has further reconfigured information literacy by positioning intelligent systems as active participants in knowledge production. AI-generated content challenges traditional assumptions about authorship, authority, and credibility, requiring new forms of critical and ethical engagement with information outputs (Broussard, 2018; Guzmán-Simón et al., 2023).

In response, concepts such as algorithmic literacy and AI literacy extend existing information literacy frameworks by emphasizing awareness of training data, model limitations, and embedded biases. These perspectives underscore the importance of transparency, accountability, and ethical attribution in AI-mediated information environments, aligning with emerging discussions on algorithmics and responsible AI use (Long & Magerko, 2020; Floridi & Cowls, 2021; UNESCO, 2023).

Toward an Integrated Socio-Algorithmic Framework of Information Literacy

Building on these developments, contemporary information literacy can be understood as an integrated socio-algorithmic system encompassing technical competencies, critical cognition, ethical reasoning, and algorithmic awareness. Rather than treating algorithms and AI as external tools, this perspective positions them as integral components of the information ecosystem that shape how knowledge is produced, evaluated, and shared (Floridi, 2013; Noble, 2018).

The convergence of the ACRL Framework (2015) and UNESCO MIL Framework (2023) provides a conceptual foundation for this integration, enabling the development of models that address both individual competencies and broader societal implications. Accordingly, this study adopts a socio-algorithmic perspective on information literacy that underpins the subsequent bibliometric and thematic analysis and supports theory-building in AI-mediated knowledge environments (ACRL, 2015; UNESCO, 2023).

This socio-algorithmic conceptualization provides the analytical lens through which the bibliometric and thematic findings are interpreted in the Discussion section

The theoretical framework presented above establishes the conceptual foundations of information literacy as a socio-algorithmic epistemic system. It is not intended to provide an exhaustive explanatory account, but rather to delineate the analytical lenses guiding the study. Accordingly, the subsequent applied framework operationalizes these concepts through bibliometric and thematic analysis, while the discussion section interprets the findings to identify emerging research gaps and future directions. This structure ensures a clear distinction between conceptual grounding, empirical analysis, and forward-looking interpretation.

Third: The Applied Framework of the Study

Building on the socio-algorithmic framework outlined earlier, the following section translates these concepts into measurable bibliometric and thematic indicators.

From Quantitative Measurement to Conceptual Construction: Toward an Integrative Cognitive Model of Information Literacy in the Age of Artificial Intelligence.

The bibliometric analysis of 1,243 studies (2000–2025) reveals steady growth and a significant conceptual shift in information literacy research—from technical skills such as searching and organizing to higher-order cognitive and critical competencies focused on context, credibility, and reflection (Pinto et al., 2020; Lloyd, 2021). In its latest socio–algorithmic phase, information literacy integrates algorithms and artificial intelligence as co-creators of knowledge, emphasizing algorithmic awareness and ethical engagement. Guided by UNESCO (2023), information literacy

is now understood as a dynamic human–machine system that unites cognitive, critical, and ethical dimensions in the creation of knowledge.

Structural Analysis of Scholarly Production and Its Trends

The structural analysis identified six evolutionary phases in Information Literacy, showing a shift from skills-based practices to an integrated theoretical framework that unites technical, cognitive, ethical, and algorithmic dimensions. This reflects the field’s growing maturity and conceptual depth.

Table (1): Evolutionary Phases and Cognitive Clusters in Information Literacy Studies (2000–2025)

Evolutionary Phase	Dominant Concept	Average Frequency	Period
Phase 1	Search Skills and Critical Evaluation	386	2000–2010
Phase 2	Information Literacy–Based Teaching and Learning	274	2010–2016
Phase 3	Integration of Media and Information Literacy (MIL)	198	2015–2020
Phase 4	Information Ethics and Digital Citizenship	142	2018–2023
Phase 5	Artificial Intelligence and Algorithmic Literacy	89	2020–2025
Phase 6	Theoretical Models and Cognitive Integration	68	2022–2025

The analysis of 1,243 studies published between 2000 and 2025 indicates a steady increase in Information Literacy research, with an average annual growth rate of 7.8% and a publication peak observed in 2021. The identified thematic phases suggest a gradual expansion of research interests from search skills and information retrieval toward topics related to media literacy, information ethics, digital citizenship, artificial intelligence, and algorithmic literacy. These findings provide evidence of increasing thematic diversification within the field over time.

Quantitative Analysis of Research Maturity Indicators (KPIs)

The integration of ACRL and UNESCO MIL frameworks redefines information literacy as a holistic cognitive system connecting access, evaluation, creation, participation, and algorithmic awareness. It responds to digital transformation by fostering AI-augmented literacy that unites technical, ethical, and social competencies in the relationship between humans, information, and technology.

Table (2): The Four Dimensions for Measuring Global Information Literacy Maturity (Based on the Analysis of 37 Quantitative Studies, 2015–2024)

Dimension	Key Indicators	Global Mean	Analytical Interpretation
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		Score	
Skill-Based	Search strategies, filtering, documentation	4.25 / 5	High maturity observed in technical universities and Western educational systems
Cognitive	Critical analysis, contextual understanding, reflective thinking	3.88 / 5	Steady growth driven by the adoption of ACRL frameworks in higher education
Ethical	Integrity, authorship rights, information justice	3.62 / 5	Global average; requires further integration within Arab curricula
Algorithmic	Result interpretation, bias detection, transparency of use	2.94 / 5	Lowest global performance; an emerging dimension requiring greater research focus

The results show that skill-based literacy scores highest worldwide ($M = 4.25$), indicating strong institutional proficiency, especially in Western and technical universities aligned with the ACRL Framework. The cognitive dimension ranks second ($M = 3.88$), reflecting growing emphasis on critical and contextual thinking. The ethical dimension ($M = 3.62$) is developing but remains limited in Arab curricula, which still prioritize technical skills over values like information justice. The algorithmic dimension scores lowest ($M = 2.94$), confirming its status as an emerging area focused on AI, bias, and transparency.

Overall, findings suggest a hierarchical progression in information literacy—from skills to cognition, to ethics, and finally to algorithmic awareness—supporting the creation of a four-dimensional integrative model for evaluating information literacy maturity (Ng et al., 2021; Lee et al., 2023; Guzmán-Simón et al., 2023).

Epistemic Interpretation of Future Trends in Information Literacy Research

The analysis of citation mapping and thematic evolution in the literature from 2000 to 2025 reveals that the field of Information Literacy (IL) is undergoing a profound epistemic transformation—shifting from a focus on technical and research-oriented awareness toward algorithmic and AI-oriented awareness.

The forthcoming stage in the field's evolution can be characterized as an Epistemic–Algorithmic Phase, which moves beyond the emphasis on search tools and information retrieval to critically examine the mechanisms of knowledge production and the standards of reliability within intelligent information environments.

Evaluating the Credibility of AI-Generated Information

This represents one of the most pressing research gaps of the coming decade. Despite the rapid proliferation of generative AI tools such as ChatGPT, Claude, and Gemini, empirical studies assessing the credibility of these tools' outputs total only 13 publications up to 2025.

Reviews by Guzmán-Simón et al. (2023) and Ng et al. (2021) reveal that existing frameworks—

such as the ACRL Framework (2015) and UNESCO MIL Framework (2023)—were not originally designed to evaluate AI-generated information. This creates a significant knowledge gap regarding trust, transparency, and verification standards within algorithmic environments.

The literature suggests the need to develop new AI Output Evaluation Frameworks based on indicators such as:

- Semantic consistency of generated content,
- Referential accuracy and proper source attribution,
- Detection of algorithmic bias, and
- Transparency in disclosing training data and model parameters.

This emerging need redefines the Evaluate and Use competencies within the UNESCO Media and Information Literacy (MIL) Framework, positioning them as continuous and reflexive practices that extend to engaging with artificial intelligence as a co-producer of knowledge, rather than merely as a research tool (UNESCO, 2023; Floridi & Cowls, 2021). research Gaps in AI Attribution and Data Governance Integration:

Current research reveals critical gaps in information literacy studies, particularly in AI attribution and integration with data governance. Over 80% of post-2023 studies employ AI tools without proper citation, underscoring the need for standardized AI Attribution Frameworks that ensure transparency, credibility, and acknowledgment of AI as a co-creator of knowledge. Likewise, only 1.6% of studies connect Information Literacy (IL) with Data Governance (DG), despite global open-data initiatives. Future research must align IL and DG through principles of transparency, accountability, algorithmic fairness, and the FAIR standards, advancing IL from a technical skill to a policy-level competency that bridges ethics, governance, and artificial intelligence in the emerging epistemic–algorithmic paradigm.

Key transitions include:

1. A shift from citing sources to citing technologies, and
2. From accessing information to governing its flow within AI-driven environments.

This transformation gives rise to AI-Infused Information Literacy—a new framework that integrates artificial intelligence as both a cognitive and ethical dimension in higher education, fostering trust, transparency, and governance across the entire knowledge lifecycle.

Analysis of Research Gaps and the Construction of an Integrative Model of Information Literacy in the Age of Artificial Intelligence

Table (3) highlights three key gaps in Information Literacy (IL) research—trust in AI outputs, AI attribution, and data governance integration. The field remains focused on skills, with ethical and algorithmic dimensions still emerging, pointing to the need for a unified model that adapts to rapid technological change.

Table (4): Future Research Gaps in Information Literacy Studies (2000–2025)

Research Gap	Number	of	Corresponding	Future Research Proposals
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	Studies	Theoretical Focus	
Trust in AI Outputs	13 studies	Evaluate & Use (UNESCO MIL) / Authority is Constructed (ACRL)	Develop frameworks to evaluate AI outputs and conduct studies on trust and credibility.
AI Attribution	≈ 80% of studies lack clear standards	Information Has Value (ACRL) / Responsible Participation (UNESCO)	Create a unified AI citation standard and study its ethical and policy impacts.
Integration of IL with Data Governance	20 studies (1.6%)	Use-Participate (UNESCO) / Information Creation as a Process (ACRL)	Integrate FAIR and Data Literacy principles into university policies and academic curricula.

The analysis identifies three major research gaps:

1. Trust in AI Output – Few studies assess the credibility of AI-generated content.
2. AI Attribution – Most lack standards for documenting AI use.
3. Integration with Data Governance – Minimal focus on linking information literacy with institutional data policies.

Accordingly, the study proposes an integrative cognitive model linking scholarly production, application of ACRL and UNESCO MIL frameworks, and four literacy dimensions—technical, cognitive, ethical, and algorithmic—positioning information literacy as a dynamic human-machine-society system that supports responsible digital citizenship in the AI era.

Discussion

Interpretation of Key Findings

Guided by the socio-algorithmic framework outlined earlier, the following discussion interprets the bibliometric and thematic findings in relation to cognitive, ethical, and algorithmic dimensions of information literacy.

The findings reveal a sustained growth in information literacy research between 2000 and 2025, accompanied by a clear conceptual shift from skills-oriented approaches toward more integrative cognitive, ethical, and algorithmic perspectives. Bibliometric patterns indicate increasing thematic diversification, with recent scholarship emphasizing artificial intelligence, algorithmic mediation, and digital citizenship. The alignment of thematic clusters with international frameworks demonstrates that information literacy is no longer confined to information access and evaluation, but increasingly addresses authority construction, ethical participation, and the interpretation of AI-generated knowledge. These results suggest a maturation of the field and reflect broader transformations in digitally mediated knowledge environments.

Theoretical Contributions

This study advances information literacy research by reconceptualizing the field as a socio-algorithmic epistemic system rather than a static set of competencies. By empirically aligning the ACRL Framework (2015) with UNESCO's Media and Information Literacy Framework (2023) across a 25-year corpus, the study provides longitudinal evidence of their functional convergence and extends both frameworks into the context of artificial intelligence. The proposed AI-augmented information literacy model introduces algorithmic awareness as a core theoretical dimension, highlighting trust in AI outputs, ethical attribution, and transparency as central concerns for contemporary information practices and future theory-building.

Practical and Policy Implications

From an educational and policy perspective, the findings underscore the need to embed information literacy within higher education curricula as a multidimensional competence encompassing technical, cognitive, ethical, and algorithmic dimensions. Institutions should support professional development initiatives that prepare faculty and students for critical and transparent engagement with AI-driven systems. At the policy level, aligning information literacy initiatives with global frameworks such as ACRL and UNESCO MIL, alongside data governance and FAIR principles, can enhance coherence, accountability, and international comparability, thereby strengthening the role of information literacy in digitally transformed knowledge ecosystems

Integrated ACRL–UNESCO Model for AI-Augmented Information Literacy

The findings suggest substantial conceptual convergence between the ACRL Framework (2015) and UNESCO MIL Framework (2023). Based on this convergence, an integrated AI-Augmented Information Literacy model is proposed, incorporating algorithmic awareness as an emerging dimension of contemporary information literacy.

Table (4): Functional Integration Between the ACRL Framework (2015) and the UNESCO Media and Information Literacy (MIL) Framework (2023) in the Context of AI-Augmented Information Literacy

Dimension	Corresponding ACRL Concepts	Corresponding UNESCO Stages	Learning and Research Outcomes
Access	Searching as Strategic Exploration	Access	Identifying information needs and developing effective search strategies
Evaluate	Authority is Constructed & Contextual	Evaluate	Assessing authority and credibility within contextual frameworks
Use & Create	Information Creation / Has Value	Use / Create	Producing original and ethically documented

			knowledge
Participate	Scholarship as Conversation	Participate	Engaging in scholarly dialogue and practicing responsible digital citizenship
Algorithmic Awareness (AI Literacy)	Emerging Dimension of Information Literacy	Meta-Cognition	Interpreting AI-generated outputs with critical awareness

The proposed integration of the ACRL Framework (2015) and UNESCO MIL Framework (2023) suggests a broader conceptual perspective on Information Literacy that incorporates access, evaluation, creation, participation, and algorithmic awareness. The model highlights the potential relationships among technical, cognitive, ethical, and social dimensions within contemporary information environments. Furthermore, the inclusion of algorithmic awareness reflects the growing influence of artificial intelligence and digital technologies on information practices. This integrative perspective may provide a useful framework for interpreting Information Literacy in AI-mediated environments.

Conclusion

This study examined the development of Information Literacy research between 2000 and 2025 through a combined bibliometric and thematic analysis of 1,243 publications. The findings indicate a gradual expansion of research interests from search and retrieval skills toward broader themes related to critical thinking, information ethics, digital citizenship, artificial intelligence, and algorithmic awareness.

The analysis also suggests increasing conceptual convergence between the ACRL Framework (2015) and UNESCO's Media and Information Literacy Framework (2023), highlighting the growing importance of integrating cognitive, ethical, and technological dimensions within contemporary Information Literacy research.

Furthermore, the identified research gaps related to AI-generated content, algorithmic awareness, and data governance point to several promising directions for future investigation. Taken together, these findings provide insights into the evolving nature of Information Literacy and its potential role within AI-mediated information environments and digitally transformed knowledge ecosystems.

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