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A Review of Information Literacy Programs in Academic Libraries and Their Influence on Research Productivity

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Abstract
Information literacy (IL) has emerged as a cornerstone competency for scholarly work in the digital era, and academic libraries occupy a central role in cultivating it. This review synthesizes peer-reviewed scholarship published between 2015 and 2024 to examine how IL programs delivered through academic libraries influence the research productivity of students, faculty, and early-career researchers. Drawing on twenty studies spanning the United States, Europe, Asia, Africa, and the Middle East, the paper evaluates the design, pedagogy, and assessment of IL interventions and traces their documented links to measurable scholarly outputs such as publication counts, citation impact, thesis completion rates, and the quality of literature engagement. The synthesis indicates that embedded, curriculum-integrated, and discipline-specific IL instruction is more strongly associated with productivity gains than one-shot library sessions. Programs that combine database proficiency, citation management, systematic search strategies, and research-data literacy correlate with improved manuscript quality and reduced time-to-completion for graduate work. The review also identifies persistent gaps: inconsistent assessment frameworks, limited longitudinal evidence, uneven access in resource-constrained institutions, and weak integration of emerging competencies such as artificial-intelligence literacy and open-science practices. Two summary tables consolidate program typologies and reported productivity outcomes. The paper concludes that IL programs exert a positive but unevenly evidenced influence on research productivity, and it proposes directions for stronger causal designs, standardized metrics, and adaptation to an evolving information ecosystem.

Keywords: information literacy, academic libraries, research productivity, embedded librarianship, library instruction, scholarly communication

1. Introduction

The capacity to locate, evaluate, and ethically use information has become inseparable from the conduct of credible research. As scholarly output accelerates and the volume of accessible literature expands, the skills bundled under the term information literacy increasingly determine whether researchers can navigate this abundance productively. Academic libraries, historically the custodians of scholarly collections, have repositioned themselves as instructional partners that teach these competencies directly. This review examines the accumulated evidence on whether and how the information literacy programs they deliver shape research productivity (Saunders, 2017). The five subsections below establish the

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conceptual background, situate libraries within the research enterprise, define the productivity construct, articulate the rationale and questions guiding the review, and outline its scope and method.

1.1 Background and Conceptual Framing

Information literacy is most widely understood through the Association of College and Research Libraries Framework for Information Literacy for Higher Education, which reconceived the competency as a set of interconnected threshold concepts rather than a checklist of discrete skills (Bombaro, 2016). This shift reframed IL as a metaliteracy encompassing the critical, reflective, and participatory dimensions of engaging with a complex information landscape. Within this framing, productive research depends not only on technical search ability but on understanding authority, the iterative nature of inquiry, and the scholarly conversation a researcher seeks to enter (Mackey & Jacobson, 2019). The conceptual breadth of the Framework has expanded what library instruction is expected to deliver, moving it closer to the substance of research methodology itself.

This conceptual evolution carries direct implications for how programs are designed and for what outcomes can reasonably be expected of them. Where earlier skills-based models emphasized discrete competencies such as Boolean searching or catalog navigation, the threshold-concept approach treats information literacy as a developmental process that unfolds across a research career rather than a one-time acquisition. Critics note that the abstraction of the Framework can complicate assessment, since threshold concepts are by definition difficult to measure through conventional testing (Bombaro, 2016). Nonetheless, the reframing has been influential because it connects library instruction to the higher-order reasoning that research productivity ultimately requires, providing a theoretical bridge between what librarians teach and what scholars produce. Understanding this conceptual foundation is essential for interpreting the empirical literature, because studies grounded in a skills model and those grounded in a metaliteracy model measure fundamentally different things.

1.2 The Role of Academic Libraries in the Research Enterprise

Academic libraries have evolved from passive repositories into active agents in knowledge production, offering services that span database access, systematic review support, data management planning, and scholarly communication guidance (Cox & Pinfield, 2019). The embedded librarian model, in which librarians join courses, research teams, or departments as ongoing collaborators, exemplifies this repositioning and has been associated with deeper engagement than traditional, standalone instruction (Schulte, 2018). As institutions face pressure to demonstrate research impact, libraries increasingly frame their instructional work as a contribution to that impact, positioning IL programs as infrastructure for productivity rather than ancillary support.

This repositioning has been accelerated by structural changes in the scholarly ecosystem. The proliferation of open-access journals, the growth of institutional repositories, the rise of research-data mandates from funders, and the increasing emphasis on bibliometric indicators have collectively widened the range of competencies that researchers must master and that libraries are positioned to teach. Many libraries have responded by reorganizing staff around

functional roles such as data librarians, scholarly communication librarians, and systematic review specialists, signaling a deliberate alignment with the research mission of the institution (Cox & Pinfield, 2019). The credibility of this alignment, however, depends on the library demonstrating that its instructional and consultative work produces measurable returns, which is precisely the question this review examines. The shift from collection-centered to engagement-centered service models has therefore raised the stakes for evidence, because libraries now justify their value in terms of outcomes they have historically struggled to measure.

1.3 Defining Research Productivity

Research productivity is a multidimensional construct that resists a single definition. Quantitative indicators include the number of publications, citation counts, h-index values, grant acquisition, and the rate of thesis or dissertation completion, while qualitative indicators encompass the methodological rigor of literature reviews, the appropriateness of source selection, and adherence to ethical citation practices (Aharony & Bronstein, 2017). For the purposes of this review, research productivity is treated broadly as the volume, efficiency, and quality of scholarly outputs, recognizing that IL programs may plausibly influence each dimension through distinct mechanisms. This breadth is necessary because the reviewed literature reports outcomes across all of these facets rather than converging on one metric.

The multidimensionality of the construct has direct consequences for evaluating the influence of IL programs. A program might improve the quality of a literature review without increasing the raw number of publications, or it might accelerate completion without altering citation impact. Treating productivity as a single number therefore risks obscuring the specific mechanisms through which library instruction operates. Moreover, the most readily quantified indicators, such as publication and citation counts, are also the most distal from the point of instruction and the most confounded by factors outside the library's influence, including disciplinary publishing norms, supervisor quality, and institutional resources. The qualitative indicators, though harder to measure, are often more proximate to what IL instruction actually targets. This review therefore weighs evidence across the full range of indicators rather than privileging the most easily counted, while acknowledging that the choice of metric strongly shapes the apparent magnitude of any effect.

1.4 Rationale and Research Questions

Although the value of IL instruction is widely asserted, the empirical link between specific program features and concrete research outcomes remains unevenly documented. Much of the literature evaluates short-term skill gains or student satisfaction rather than downstream productivity, leaving practitioners with limited guidance on which interventions yield scholarly returns (Walsh, 2016). This review therefore asks three questions: which models of IL instruction are most strongly associated with research productivity; through what mechanisms do these programs exert their influence; and what gaps in evidence and practice constrain confident conclusions. Answering these questions is intended to inform both program design and the research agenda for library and information science.

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1.5 Scope and Method of the Review

This review draws on twenty peer-reviewed studies published between 2015 and 2024, selected to represent diverse institutional contexts, disciplinary settings, and methodological approaches, including experimental, survey-based, and qualitative designs. Sources were identified through library and information science databases and screened for direct relevance to the relationship between library-delivered IL instruction and research outcomes. The synthesis is narrative rather than meta-analytic, given the heterogeneity of outcome measures across studies, and it organizes the evidence around program models, mechanisms, and measured outcomes. Two summary tables consolidate the typologies and findings discussed throughout.

2. Literature Review

The literature on IL programs and research productivity spans a decade of methodological diversification and conceptual broadening. The following four subsections organize this body of work around the models of instruction libraries deploy, the documented effects on student and graduate outcomes, the influence on faculty and early-career researchers, and the assessment frameworks used to evaluate impact.

2.1 Models of Information Literacy Instruction

The reviewed studies consistently distinguish between one-shot instruction, course-integrated instruction, and fully embedded librarianship, with evidence favoring the more integrated forms. One-shot sessions, though efficient and scalable, are widely criticized for producing only transient skill gains that fade without reinforcement (Bowles-Terry & Donovan, 2016). Course-integrated instruction, by contrast, aligns library content with specific assignments and disciplinary needs, and studies report stronger retention and transfer of skills under this model (Junisbai, Lowe, & Tagge, 2016). The embedded model represents the most intensive approach, with librarians participating across the duration of a course or research project; research associates this sustained presence with measurable improvements in the quality of student bibliographies and source evaluation (Schulte, 2018). A parallel strand examines online and asynchronous IL delivery, which expanded substantially during and after the pandemic and shows comparable skill outcomes when interactive elements are preserved (Mery & Newby, 2019). Discipline-specific tailoring emerges across these models as a recurring predictor of effectiveness, since the information practices of the sciences, humanities, and professional fields differ markedly (Hoffmann, Antwi-Nsiah, Feng, & Stanley, 2020).

The comparative evidence across these models points to a consistent gradient: the more deeply instruction is woven into the research context and the longer the librarian remains involved, the stronger the reported outcomes. This gradient is most plausibly explained by the timing and relevance of instruction. When skills are taught in the abstract and divorced from an immediate research task, learners have little opportunity to apply and consolidate them, whereas instruction delivered at the moment a researcher confronts a genuine information problem is reinforced by immediate use (Junisbai et al., 2016). The embedded model maximizes this alignment by making the librarian continuously available as questions arise. Yet the same features that make embedded instruction effective also make it costly and difficult to scale,

creating a tension between pedagogical impact and institutional capacity that recurs throughout the literature (Schulte, 2018). Hybrid approaches that combine scalable online modules with targeted embedded consultation have been proposed as a way to reconcile this tension, though rigorous comparative evaluations of such blended models remain limited (Mery & Newby, 2019).

2.2 Effects on Student and Graduate Research Outcomes

A substantial portion of the literature evaluates IL effects on students, particularly at the graduate level where research output is more directly observable. Several studies report that structured IL instruction improves the methodological quality of literature reviews and the breadth and relevance of cited sources in theses and dissertations (Catalano, 2015). Graduate students who received systematic search training demonstrated greater efficiency in identifying relevant literature and reported reduced anxiety and time expenditure during the review phase, factors plausibly linked to faster completion (Rempel & Davidson, 2018). At the undergraduate level, the link to productivity is more indirect, manifesting as improved assignment quality and stronger preparation for capstone research rather than formal publication (Mahmood, 2017). A recurring theme is that the benefits are most pronounced when instruction is delivered at the point of need, integrated into the research workflow rather than front-loaded before students have a concrete information problem to solve (Wong & Cmor, 2017). Citation analysis studies provide some of the more concrete evidence, showing that students exposed to IL instruction cite more scholarly and peer-reviewed sources and rely less on non-authoritative web content (Reinsfelder, 2018).

Beyond citation behavior, a smaller set of studies links library engagement to summative academic indicators. Research correlating instruction exposure with graduation grade point average found a positive association, though the authors appropriately cautioned that such correlations cannot establish causation given the difficulty of isolating instruction from the many other influences on academic achievement (Wong & Cmor, 2017). Case studies of undergraduate research programs likewise report that library partnerships are associated with more ambitious and better-documented student projects, suggesting that the influence of IL extends into the formative research experiences that precede graduate study (Reinsfelder & Pike, 2019). Taken together, the student-focused literature offers the most abundant evidence in the field, but it concentrates on proximate outcomes such as source quality and assignment performance rather than on the distal scholarly outputs that institutions most often equate with productivity. The inferential leap from a stronger undergraduate bibliography to a future publication record remains largely untested, a limitation that tempers the otherwise encouraging tone of this body of work.

2.3 Influence on Faculty and Early-Career Researchers

Evidence on faculty and early-career researchers is sparser but suggests that library support for advanced research practices contributes to productivity in ways distinct from student instruction. Studies of systematic review services, in which librarians co-design search strategies and screen literature, report that such collaboration improves the comprehensiveness and reproducibility of searches and is increasingly recognized through co-authorship (Spencer

& Eldredge, 2018). Research-data management instruction has also been linked to compliance with funder mandates and to more efficient data handling, both of which bear on the capacity to publish and secure grants (Cox & Pinfield, 2019). Early-career researchers, in particular, appear to benefit from instruction in scholarly communication, including journal selection, predatory-publishing avoidance, and open-access strategy, which can shape the visibility and impact of their work (Aharony & Bronstein, 2017). However, faculty engagement with library programming is frequently uneven, constrained by perceptions that library services are oriented toward students, a barrier that several authors identify as limiting the realization of productivity gains at this level (Saunders, 2017).

The co-authorship of librarians on systematic reviews is a particularly instructive case, because it represents one of the few settings in which a library contribution to research output is made explicit and verifiable in the scholarly record (Spencer & Eldredge, 2018). Where a librarian designs and documents the search strategy, the resulting methods section bears a direct trace of library expertise, and reporting standards for systematic reviews increasingly expect this involvement. This visibility contrasts with most other forms of IL support, whose influence is diffuse and difficult to attribute. The faculty-oriented literature thus suggests that the clearest evidence of productivity impact arises precisely where the library's contribution is embedded in a formalized, reportable research process. Extending this principle, some authors argue that libraries should seek deeper integration into the documented infrastructure of research, such as data-management plans and reproducibility workflows, both to serve researchers and to render the library's contribution legible to the metrics by which institutions assess value (Cox & Pinfield, 2019).

2.4 Assessment Frameworks and Evidence of Impact

The assessment of IL programs remains methodologically contested, and this weakness conditions the strength of every claim about productivity. Many evaluations rely on pre- and post-test designs measuring immediate skill gains, which capture learning but not its translation into research output (Oakleaf, 2015). Performance-based and rubric-driven assessments of authentic student work, such as scored bibliographies and research papers, offer a closer proxy for productivity but are labor-intensive and inconsistently applied (Gross, Latham, & Julien, 2018). A smaller body of work attempts longitudinal or value-added designs that track students over time, and these provide the most credible evidence of durable impact, though they remain rare because of the resources required (Bowles-Terry & Donovan, 2016). Across the literature, authors lament the absence of standardized, comparable metrics, which prevents meta-analysis and leaves the field reliant on a patchwork of context-specific findings (Walsh, 2016). This methodological fragmentation is the single most consistent limitation identified across the reviewed studies and frames the cautious tone of the conclusions that follow.

Part of the difficulty is conceptual rather than merely logistical. Because the threshold-concept model defines information literacy in terms of internalized dispositions and ways of thinking, the competencies it describes are inherently resistant to the multiple-choice instruments that dominate large-scale assessment (Gross et al., 2018). Authentic assessment of genuine research products comes closer to capturing these dispositions but sacrifices comparability across

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institutions, since rubrics and assignments differ widely. The field thus faces a trade-off between measures that are standardized but shallow and measures that are rich but idiosyncratic. A further complication is attribution: even where a productivity gain is observed, isolating the library's contribution from the influence of coursework, mentorship, and prior preparation requires control groups and statistical adjustment that most program evaluations lack (Oakleaf, 2015). Until the field converges on shared, validated instruments and adopts designs capable of supporting causal inference, claims about the influence of IL programs on research productivity will continue to rest on an accumulation of suggestive but individually limited studies.

Table 1

Typology of Information Literacy Instruction Models in Academic Libraries

Model	Key Characteristics	Reported Strength of Productivity Link
One-shot session	Single standalone class; broad orientation to resources; scalable but isolated from assignments	Weak; gains tend to fade without reinforcement (Bowles-Terry & Donovan, 2016)
Course-integrated	Instruction aligned to specific assignments and disciplinary needs; delivered at point of need	Moderate to strong; better retention and transfer (Junisbai et al., 2016)
Embedded librarianship	Sustained librarian presence across a course or research team; ongoing collaboration	Strong; improved bibliographies and source evaluation (Schulte, 2018)
Online / asynchronous	Self-paced modules, tutorials, and interactive web content; scalable across cohorts	Comparable to in-person when interactivity is preserved (Mery & Newby, 2019)
Research-support services	Systematic review and data-management collaboration with faculty and researchers	Strong for advanced output; linked to co-authorship and compliance (Spencer & Eldredge, 2018)

Note. Synthesized from reviewed literature, 2015–2024.

Table 2

Reported Research-Productivity Outcomes Associated with IL Programs

Outcome Dimension	Documented Effect	Representative Source
Source quality	Higher proportion of scholarly, peer-reviewed citations; less reliance on non-authoritative web content	Reinsfelder (2018)

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Outcome Dimension	Documented Effect	Representative Source
Time-to-completion	Greater search efficiency and reduced time on the literature-review phase of graduate work	Rempel & Davidson (2018)
Literature-review quality	Improved methodological rigor and breadth in theses and dissertations	Catalano (2015)
Search comprehensiveness	More reproducible and exhaustive searches in systematic reviews via librarian collaboration	Spencer & Eldredge (2018)
Scholarly communication	Better journal selection and avoidance of predatory venues among early-career researchers	Aharony & Bronstein (2017)
Data management	Improved funder-mandate compliance and more efficient handling of research data	Cox & Pinfield (2019)

Note. Effects are correlational unless the cited study used an experimental design.

3. Conclusion

This review of scholarship published between 2015 and 2024 indicates that information literacy programs delivered through academic libraries exert a positive but unevenly evidenced influence on research productivity. The most consistent finding is that the form of instruction matters more than its mere presence: embedded, course-integrated, and discipline-specific models are associated with stronger outcomes than isolated one-shot sessions, because they situate skill development within the research workflow at the point of need (Schulte, 2018; Wong & Cmor, 2017). At the graduate level, where outputs are most observable, IL instruction is linked to higher-quality literature reviews, more authoritative citation practices, and greater efficiency during the literature-search phase, all of which plausibly contribute to faster and better-supported scholarly work (Catalano, 2015; Rempel & Davidson, 2018).

For faculty and early-career researchers, the evidence is thinner but points to meaningful contributions through systematic review collaboration, research-data management, and scholarly communication guidance, with librarian co-authorship emerging as a tangible marker of impact (Spencer & Eldredge, 2018; Cox & Pinfield, 2019). At the same time, the field's conclusions must remain cautious. The dominant reliance on short-term skill assessments, the scarcity of longitudinal and causal designs, and the absence of standardized productivity metrics together prevent firm causal claims and preclude meta-analytic synthesis (Walsh, 2016; Oakleaf, 2015). Much of the reported relationship is correlational, and selection effects,

whereby more motivated researchers seek out library support, cannot be ruled out in most designs.

The practical implication for academic libraries is to invest in integrated, sustained, and discipline-aware instruction and to pair it with authentic, work-based assessment rather than satisfaction surveys or isolated pre-tests. The implication for the research community is that the productivity case for IL programs, while promising, requires stronger evidentiary foundations before it can be asserted with confidence. Libraries that wish to demonstrate their contribution to institutional research impact will need to align their assessment practices with the outcome measures that matter to that impact.

4. Future Work

Several priorities follow from the gaps this review identifies. First, the field needs rigorous longitudinal and quasi-experimental designs that track researchers from instruction through to scholarly output, ideally using comparison groups and controlling for prior ability and motivation, so that the influence of IL programs can be distinguished from selection effects (Bowles-Terry & Donovan, 2016). Second, the development and adoption of standardized, comparable productivity metrics would enable cross-institutional synthesis and eventual meta-analysis, addressing the fragmentation that currently limits the evidence base (Walsh, 2016).

Third, future programs and studies must address emerging competencies that the reviewed literature only began to touch. The rapid integration of generative artificial intelligence into research workflows raises new questions about how libraries should teach the evaluation, ethical use, and citation of AI-assisted information, an area where IL frameworks are still being adapted (Mackey & Jacobson, 2019). Likewise, open-science practices, including data sharing, preprinting, and reproducibility, represent a growing dimension of productivity that IL programs are well positioned to support but have not yet systematically addressed (Cox & Pinfield, 2019).

Fourth, more research is needed on equity and access, since most of the strongest evidence originates from well-resourced institutions, leaving open the question of how IL programs influence productivity in resource-constrained settings where database access and staffing are limited (Mahmood, 2017). Finally, deeper investigation of faculty and early-career engagement, including the organizational and cultural barriers that limit uptake, would help libraries extend their documented student-level benefits to the populations whose productivity is most directly measured by institutions (Saunders, 2017). Pursuing these directions would move the field from asserting the value of information literacy toward demonstrating it with the rigor the claim deserves.

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