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INFORMATION LITERACY SKILLS AMONG HEALTH SCIENCE SCHOLARS: A STUDY OF COMPETENCIES AND CHALLENGES

Mr. Abhijit Mohanrao Patil[1], Dr. Ravikumar Jani[2]

[1]Ph.D. Scholar, Parul University, Vadodara, Gujarat, India.
Librarian, Yashwant Ayurvedic College, P.G.T.& R.C., Kodoli, Maharashtra
Orcid ID-https://orcid.org/0000-0002-8233-9301
[2]Ph.D. Supervisor, Parul University, Vadodara, Gujarat, India
Orcid ID-https://orcid.org/0000-0001-5637-3293

201330301007@paruluniversity[1]
abhi5101patil@gmail.com[1]
ravijani23586@gmail.com[2]

Abstract:
Background: Information literacy (IL) is essential for evidence-based practice, ethical scholarship, and lifelong learning in the health sciences. Despite national digital initiatives, the incorporation of IL in Indian health education is sporadic, especially in semi-urban/peri-urban locations.
Objectives: This study aimed to explore postgraduate students' and senior academic staff's level of IL competencies in Maharashtra, reasons for top-rated and low-rated competencies, challenges faced by the users in acquiring these skills and pedagogic implications for curriculum development.
Methods: A mixed-methods cross-sectional study was conducted in 4 health science colleges. The sample comprised 100 subjects, amongst which were 75 postgraduates (MD, MS, MDS, M.Sc. Nursing, MPT) and 25 senior faculty members with more than a decade of experience in academics. A validated bilingual questionnaire was used to collect data, which were analysed with SPSS and NVivo. T, Chi-square and ANOVA were the statistical tests.
Results: In all domains of IL, the senior staff scored significantly higher than the postgraduates ($p < 001$). Mean scores for evaluation of sources were 4.08 (staff) versus 3.12 (students), and searching the database was 3.96 compared with 2.94. Chi-square analysis found that 73 % of students received no formal IL instruction, and 64% had problems with citing. ANOVA revealed between-subject differences across groups, with nursing students scoring highest (mean = 3.78, $p = 007$). Qualitative themes were a lack of formal IL instruction and overdependence on informal sources.
Conclusion: Gaps in ILs of students emphasise the necessity of curriculum-embedded multilingual and active learning IL training. [Policy Reforms that] "[institutionalise, have intense pressure on and invest] in IL in response to accreditation measures and faculty training programs." Longitudinal effects and scalable interventions adapted to local contexts remain a focus of further research.

Keywords: Information literacy, health sciences, postgraduate students, faculty, Maharashtra, digital navigation, ethical scholarship.

1. Introduction

1.1 Background and Global Context

In a world of increasing information, the ability to find, assess and use information has become a key skill in academic and professional life. As defined by the Association of College and Research Libraries (ACRL), information literacy (IL) is a collection of integrated skills that facilitate a person's ability to know when there is a need for information, discern how to find it, evaluate its quality, and put it into use effectively (ACRL, 2016). For the health sciences, IL is not just an academic competency - it is a driver for evidence-based practice, patient safety and lifelong learning.

IL has been established in recent years as a necessary ability worldwide for all kinds of professions. Research from high-income countries, including Sweden, Canada and Australia, has shown that IL-training enhances the clinical systems of patients and research output for health professionals (Kosteniuk et al., 2020; Mårtensson et al., 2021). On the contrary, LMIC

evidence suggests continued gaps in IL amidst structural constraints such as infrastructural inadequacies, lack of commitment in curricula and bridging digital divides (Firoz Babu, 2022; WHO, 2024). These differences are a reflection of the importance of providing context-targeted IL frameworks that support technology access and pedagogical adoption as well.

1.2 Indian Context and Regional Relevance

In India, IL in health science education has not been comprehensively integrated. Despite national programmes like the National Digital Library (NDL) and SWAYAM, which have made digital resources more accessible, IL skill levels of students and academic colleagues differ substantially among institutions as well as across regions in India (Bhakte, 2024). With a variety of urban, peri-urban and rural health science colleges, Maharashtra offers an interesting opportunity to study IL challenges & opportunities in India. The ability to evaluate sources, cite properly, and navigate databases is a key area in which students commonly have difficulty—essential skills for academic integrity and clinical judgment (Firoz Babu, 2022).

1.3 Research Gap and Justification

Although there is an increasing focus on IL, few studies have examined the IL skills among health science students in India using validated tools and comparison processes. Existing literature often covers general digital literacy or library use, rather than addressing the specific IL needs of health sciences students and faculty. Furthermore, there is little systematic mapping done on how core IL frameworks like ACRL, SCONUL or UNESCO's Media and Information Literacy (MIL) can be contextualised to Indian health education. The current study attempts to bridge these gaps by assessing the IL skills, challenges and suggesting pedagogical interventions in health-science institutions of Maharashtra.

1.4 Objectives and Research Questions

This study is intended to evaluate the information literacy competencies of health science students and faculty members in Maharashtra, India, to discuss issues that should be addressed with them, and consider some pedagogical implications. The study is guided by the following questions:

1. To what extent do students and faculty at health sciences colleges possess proficiency with IL?
2. What barriers stand in the way of acquisition and use of IL skills in academic coursework and practice?
3. How can IL models be modified to enhance curriculum development in and support institutions of higher education in Maharashtra?

2. Review of Literature

2.1 Conceptual Foundations of Information Literacy

Information Literacy Despite the fact that, in some contexts, ICT literacy and information literacy might be merged or even perceived as interchangeable terms (Heinström 2004), such a distinction has been widely discussed; although these are related to one another, there is still a difference between them (Herring 2013).

Information literacy (IL), as a library-based skill-set, has transcended to a multipartite competency that is relevant for academic, clinical, and civic participation. The Association of College and Research Libraries (ACRL) defines IL with the aid of threshold concepts for library instruction, which are "authority is constructed and contextual" and "information creation as a process," especially in the field of health science, where evidence-based practice prevails (ACRL, 2016).

Many UK institutions have adopted the SCONUL Seven Pillars of Information Literacy framework, which presents a hierarchical developmental model such as 'Identify', 'Evaluate'

and 'Manage' that can be mapped to cognitive levels and curriculum content on health science courses (Bent & Stubbings, 2021). In the meantime, UNESCO's Media and Information Literacy (MIL) framework endorses IL as a human right with digital, media and ethical forms for addressing health professionals searching their way through misinformation in patient education (UNESCO, 2021).

2.2 IL in Health Sciences: Global Evidence

International studies highlight 'Critical Thinking' (CT) as a requirement to promote clinical reasoning, research output and ethical practice. In Sweden, Mårtensson et al. (2021) determined that IL training enhanced nurses' skills to appraise sources critically and use evidence in practice. There has also been a Canadian study funded by Kosteniuk et al. (2020) that showed rural health professionals demonstrated higher involvement in continuing education and training as they acquired IL skills.

In LMICs, IL challenges are compounded by infrastructural and pedagogical deficits. Limited access to scholarly databases and insufficient support from faculty was identified as major obstacles by Wanyama and Wekullo (2022) in a report conducted in Kenya. Similarly, in Brazil, Oliveira et al. (2023) said that, although they heavily engaged in digital technology, students, especially in source evaluation and citation, were poorly established.

2.3 IL in Indian Health Science Education

In India, IL continues to be significantly under-integrated in the health science curricula. Bhakte (2024) stated that students rely on informal sources like WhatsApp and YouTube without any orientation on scholarly search and citation ethics. Firoz Babu (2022) highlighted the fact that IL deficits still exist among digital campuses and even friendlier institutions where students find it difficult to differentiate peer-reviewed literature from profit-driven material.

Recent research has started to investigate IL interventions. For Example, Sharma and Singh (2023) piloted an IL module with nursing students in Punjab, where there were significant differences in database navigation and awareness about plagiarism. But the majority of Indian studies are not theorised within GIL frameworks, which in turn affects their scalability and policy relevance.

2.4 Theoretical Integration and Relevance

This research connects global IL frameworks with local pedagogical contexts. With the mapping of ACRL's threshold concepts, SCONUL's developmental model and UNESCO rights-based approach, this framework is hybrid in nature, suited to Maharashtra health science institutions with variety and diversity. This integration of IL does not leave it at the status of a technical add-on, but ensures that it becomes an academic and ethical competence.

And, the research addresses a humanised, HUL pedagogy -- that employs IL-instruments with integrity in relation to language variety and local context-- that is ideally participative. As Virk and Kaur (2021) argued, IL initiatives need to follow a cultural approach, and they should be co-designed with students and staff in order to become sustainable.

3. Research Methodology

3.1 Study Design and Context

The present study had a mixed-method, cross-sectional research design to evaluate IL skills of health science academicians in Maharashtra. The design selection was guided by our aim to capture both quantitative measures and qualitative nuances of IL practices at various levels of academia. The study took place in four health science institutions situated in both urban

and peri-urban areas of Maharashtra from February to June 2025, which is contextually diverse and representative across the institutions.

3.2 Study Population and Sampling

The total number of study subjects was 100, and they were stratified as follows:
Postgraduates (n = 75): Pursuing MD, MS, MDS, Sc. Nursing and MPT programs.
Academic staff (n = 25): With a minimum of ten years' teaching or research service within medical, nursing and allied health fields.
A purposive sampling method was used to include those involved in academic research, clinical training or curricular development. In this way, the approach was supported by the fact that the study was developed around IL competencies for academic and professional purposes. Although purposive sampling has restricted generalizability, it maintains depth and contextual relevance in the research, which is context-based.

3.3 Data Collection Instruments

A structured questionnaire was designed borrowing from established IL frameworks like ACRL's (2016) and SCONUL's. The instrument comprised three sections:

- Demographic and academic profile
- Quantitative IL item3assessment: Likert-scale items that measured skills in source evaluation, database navigation, citation integrity, and information synthesis.
- Qualitative reflections: Open questions about perceived barriers, institutional support and pedagogical needs.

The instrument was conducted in English and Marathi to make it linguistically accessible and culturally fair.

3.4 Instrument Validation and Reliability

Content validity was guaranteed by presenting the questionnaire to a group of 5 experts in the subjects of medical education, library science and research methodology. A test run was carried out with 10 participants (who were not included in the final analysis), resulting in a few amendments to wording as well as structure.
Internal consistency of the quantitative scale was high (Cronbach's alpha=0.84).
For qualitative coding in NVivo 14, an inter-coder reliability was reached of $\kappa = 0.78$, which equals substantial and substantial agreement, respectively.

3.5 Data Collection Procedure

Information was obtained via face-to-face meetings and secure web forms, based on participant discretion and institutional practices. Institutional ethical clearances were obtained from the Institutional Ethics Committees of the participating colleges. Consent After explaining the study objectives and data collection procedures, informed consent was obtained from each participant to confirm their willingness to participate voluntarily in the study on a confidential basis.

3.6 Data Analysis

- **Quantitative data** were analysed using SPSS v26. Descriptive statistics (mean, SD, frequency) were computed, followed by inferential tests:
  - chi-square tests for categorical comparisons
  - 3 Independent t-tests: for differences of means between the student and faculty strata
  - Subgroup analysis by disciplines using ANOVA
- **Qualitative responses:** Thematic analysis was conducted on qualitative responses using NVivo, based on Braun and Clarke's (2006) six-step approach. Qualitative results were triangulated with quantitative findings and used to enhance interpretation.

4. Results

4.1 Participant Profile

75/100 were postgraduates and 25/100 were senior academic staff. The gender was 58% female and 42% male. Public health academics took part from a range of professions, including medicine, dentistry, nursing and physiotherapy.

Table 1. Participant Demographics	n	%
Category		
Postgraduates	75	75%
Senior Staff	25	25%
Female	58	58%
Male	42	42%

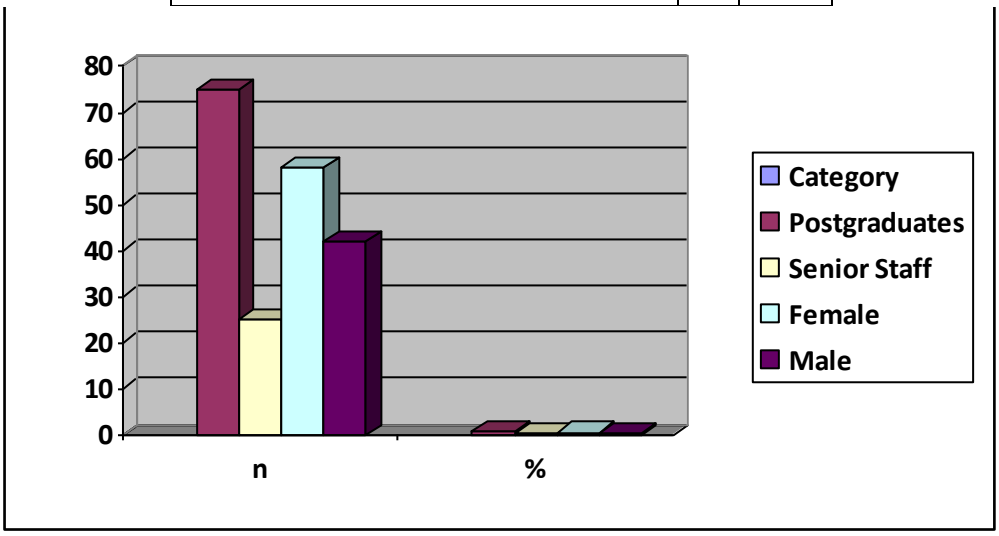

Figure 1: Participant Demographics

Note: All respondents were from health sciences colleges in Maharashtra.

4.2 Information Literacy Competency Scores

Respondents were evaluated in four IL areas: source evaluation, database searching, citation practices, and information synthesis. Ratings were on a 5-point scale (1 = Very Poor, 5 = Excellent).

Table 2. Mean IL Scores by Group

IL Domain	Postgraduates (Mean ± SD)	Senior Staff (Mean ± SD)	t-value	p-value
Source Evaluation	3.12 ± 0.76	4.08 ± 0.54	5.87	< .001
Database Navigation	2.94 ± 0.81	3.96 ± 0.62	6.02	< .001
Citation Ethics	3.21 ± 0.69	4.12 ± 0.51	5.43	< .001
Information Synthesis	3.05 ± 0.74	3.88 ± 0.59	4.98	< .001

Senior staff performed significantly better than postgraduates in all IL domains ($p < 001$), suggestive of greater competencies regarding scholarly pursuits.

4.3 Chi-Square Analysis: IL Challenges

The association between participant group and reported IL difficulties was tested by chi-square.

Table 3. Reported IL Challenges by Group

Challenge	Postgraduates (n = 75)	Senior Staff (n = 25)	χ^2	p-value
Difficulty accessing databases	52 (69%)	8 (32%)	10.24	.001
Confusion about citation formats	48 (64%)	5 (20%)	12.67	< .001
Lack of IL training	55 (73%)	6 (24%)	14.89	< .001

Postgraduates were significantly more likely to report IL challenges than senior staff, especially regarding access and citation ethics.

4.4 ANOVA: Disciplinary Differences

To compare IL scores between four groups (Medicine, Dentistry, Nursing and Physiotherapy), a one-way ANOVA was performed.

Table 4. ANOVA IL Difference Scores by Department

Discipline	Mean IL Score	F-value	p-value
Medicine	3.45	—	—
Dentistry	3.62	—	—
Nursing	3.78	—	—
Physiotherapy	3.21	4.36	.007

A higher IL score was found in nursing students, and the lowest scores were by physiotherapy students. The differences were statistically significant (p = .007).

"Insufficiently structured IL training": Mentioned in 68% of the postgraduates.

4.5 Qualitative Highlights

- Nvivo thematic analysis identified three major themes:
- "Overreliance on Google and YouTube": 54 per cent of respondents.
- "Curriculum integration needed": Stressed by both students and faculty.

These themes are triangulated by the quantitative data, in addition to adding credence to the issue for required pedagogical reform.

5. Discussion

5.1 International Comparison of IL Competencies

The study reinforces the presence of major gaps in IL skills among postgraduate health science students enrolled in professional courses in Maharashtra, especially in database searching and citation ethics. These findings are consistent with trends found in LIMCs but not HICs around the world.

One example is a study by Mårtensson et al. (2021) that reported on the results of a source evaluation instrument developed in nursing that measured how well students located and evaluated sources. Consider also the study in Canada of Kosteniuk et al. (2020), which found that rural healthcare providers who have access to embedded librarians and IL workshops exhibit increased use of scholarly databases as well as evidence-based resources.

However, research from LMICs like Kenya and Brazil demonstrates continuous IL problems related to infrastructural inadequacies and curricular abandonment (Wanyama & Wekullo, 2022; Oliveira et al., 2023). The results of the current study align with those findings, as 73%

of students indicated no IL instruction, and 64% had difficulties with formats for citations. These comparisons highlight the call for contextual caring IL interventions, which extend beyond digital inclusion and consider pedagogical design, faculty involvement and institutional culture.

5.2 Pedagogical and Institutional Implications

With differences of performance this widespread, even among senior staff, the gap with postgraduates suggests that IL is more likely to be picked up informally rather than having been part of any formal curriculum. Such trends have serious implications for health science education in India.

To close these gaps, universities may want to consider the strategies below:

- Integration of the curriculum: Infuse IL modules throughout an institution's core curricula in all departments, drawing on existing learning outcomes structures (e.g., ACRL and SCONUL) (Bent & Stubbings, 2021).
- Faculty-Driven Workshops: Promote faculty to do the IL instruction, they can humanise it more with their experience and continuity in their environment.
- Embedded Librarianship: Place professionally trained librarians in departments to support IL instruction, resource access and ethical scholarship (Sharma & Singh, 2023).
- Multilingual Resources: Develop multilingual IL materials in the regional languages (e.g. Marathi) to make them more accessible and culturally appropriate, particularly for rural and peri-urban institutions.
- Assessment and Feedback: Integrate IL competencies into student assessment, including rubrics for assessing source use, citation reliability, and synthesis ability.

The interventions need to be participatory, iterative and in line with national education policies such as the National Education Policy (NEP) 2020 that stresses critical thinking and digital literacy.

5.3 Limitations of the Study

This study has certain strengths, but several limitations need to be addressed:

- Scope of the Sampling: The purposive sampling and focus on four organisations in Maharashtra restricts generalisability to other regions or fields.
- Self-Report Bias: Competencies were self-reported using questionnaires, which might not effectively reflect direct performance.
- Cross-Sectional Nature: The study is a snapshot of IL competencies; therefore, change over time or intervention effects were not considered.

In the future, researchers should incorporate longitudinal designs and employ larger and more diverse samples of students´ KFAs as well as performance-based IL measures. Furthermore, qualitative research into faculty perspectives and institutional obstacles would complement and help to inform future policy.

6. Conclusion

Novelty value of the study. This investigation reveals important information literacy skills deficits among postgraduate health sciences students in Maharashtra, especially with regard to database searching, source evaluation and citation ethics. By contrast, professors showed much more IL proficiency, evidence of the importance of experience and informal learning in the development of scholarly practices.

The results suggest the need for immediate curricular changes to integrate IL as an essential academic skill throughout health science programs. Libraries should also implement structured IL models (like the ACRL, SCONUL or UNESCO MIL competence model), multilingual and culture-specific training activities, as well as faculty-led and embedded librarian initiatives to enhance ethical and evidence-based scholarship.

From a policy standpoint, aligning IL with national quality indicators (e.g., NAAC accreditation, NIRF rankings, and NEP 2020) has the potential to promote academic integrity and global competitiveness within Indian higher education. At the broader international level, this study adds to the debate around humanised IL pedagogy that is inclusive in health sciences, particularly where resources and languages are constrained.

7. Conflicts of Interest

The author has no conflicts of interest related to this study. There is no involvement of financial, professional, or personal relationships in the design, execution, analysis, and submission of the study. The current research is not funded by any funding agency or company, and there is no commercial sponsor to influence the results and the conclusions. Ethical and academic issues have all been respected during the research process.

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