Promoting Information Literacy in Libraries: Insights from Research on Designs and Frameworks

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Abstract *The purpose of the study is to investigate designs and frameworks utilised for promoting information literacy (IL) in libraries. Scopus was used to search research articles (2014-2023) aligned with IL design and frameworks. A total of fifteen core research articles were identified and considered for analysis. This study employed content analysis using both quantitative and qualitative approaches. Findings revealed the primary objectives, research types, applied designs and frameworks, target participants/groups, and challenges encountered while in IL programs. The outcomes of this study provide valuable insights for library professionals, researchers, practitioners, and policymakers to enhance IL initiatives. Future research could be done to examine the effectiveness of specific IL designs and frameworks and behaviours of library users.*

Keywords: *ACRL Framework; Information Literacy Skills; Information Literacy Initiatives; Library Instructions; Literacy Standards.*

Introduction

Information literacy (IL) is one of the significant aspects of our daily life. It plays a key role in enabling individuals to identify quality and right information from the vast collection of information available online and offline. It also promotes civic engagement, social responsibility, and democratic participation (Correia, 2002). Sample (2020) stated IL is the skill to efficiently and critically navigate, evaluate, and utilise information in the digital age. We could find several definitions of IL given by authors or organisations (Chakravarty, n.d). For example, in Framework for Information Literacy for Higher Education (Framework), The Association of College and Research Libraries defined IL as:

> "... *the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning* (ACRL, 2016, p.8)."

Why IL is so important in the current context? There are multiple reasons, such as becoming informed individuals, developing critical thinking, achieving academic success, gaining professional development, being aware of intellectual property rights, posing lifelong learning, and digital citizenship (ACRL, 2016). As the volume of information continues to grow and technology evolves, the importance of information literacy will only continue to increase (Naik & Padmini, 2014). Moreover, IL skills can help to combat misinformation in forms of manipulated content, false heading, and satire (Sahu et al., 2023). The IL standards encompass various international efforts, including those established by SCONUL, UNESCO, and Swiss standards. These show a global commitment to promoting IL across diverse contexts (Chakravarty, n.d).

Libraries and library professionals are among those who can effectively support the development of IL. They can enhance student learning and collaboration within this field through curriculum integration, instructional design, resource development, training, collaborative projects, assessment and feedback, as well as professional development (ACRL, 2016). This study analyses IL in libraries by drawing insights from research articles

especially focused on designs/frameworks. From examining the adoption of IL designs/frameworks to addressing the challenges, this study presents the landscape of IL practices.

Objectives

The main objective of this study is to investigate IL designs/frameworks. Some specific objectives are as follows:

To identify the types and main objectives of the research articles for promoting IL;

To examine the IL designs/frameworks and target participants;

To determine whether the articles mentioned any technological integration;

To examine the challenges encountered in designing or implementing frameworks for IL; and

To understand the main statement of the articles by analysing concluding remarks.

Related Literature

In this section, a review of existing literature has been presented. Saunders (2008) highlighted the growing citation of regional accreditation organisations in LIS literature regarding information literacy, indicating their increasing incorporation of information literacy into standards and documents, reflecting its recognised importance in higher education. Tirado (2011) pointed out the importance of information literacy as a core and cross-service in university libraries. Rubinić (2011) explored how information literacy programs are integrated into the academic curriculum and delivered to students to improve information literacy skills and their overall academic performances. Seiler et al. (2012) highlighted the positive outcomes and benefits of the e-learning course model in enhancing students' information literacy skills, research capabilities, and overall learning experience. Natt (2013) provided information regarding the complexities of business information literacy and its relevance in contemporary educational and corporate settings. Tokić (2014) investigated how Croatian tourism library websites address information literacy skills among users. The study showed the importance of users' ability to independently access, understand, and critically assess information in complex online environments.

Ullah and Ameen (2019) emphasised the importance of continuous training and awareness among faculty and management, and integrating IL into the curriculum as an independent and credit-based course. The study recommended workshops, seminars, and formal in-class teaching for delivering IL instruction to medical faculty and clinicians. Guo and Huang (2021) stressed the evolving nature of IL education, the importance of professional guidance in overcoming crises like the COVID-19 pandemic, fighting against misinformation, and the role of academic libraries as agents of digital transformation and innovation. Koos (2021) found significant contributions from the field of health and medicine and the overlooked connection between information literacy and health literacy. Some recent studies also have concentrated on IL applications and frameworks. For example, Kozlowska-Barrios (2023) depicted the predominant focus on information literacy concepts among U.S. academic librarians in teaching MIL-related content. In an evaluative study, Lessa and Lean (2023) analysed the use of digital sources by distance library students based on the ACRL framework. James and Filgo (2023) tried to figure out the place of AI in the IL frameworks. Similarly, we can explore several studies discussing IL designs or frameworks (e.g., Fuchs & Ball, 2022; Crowe et al. 2019). However, there is a gap in exploring how IL designs/frameworks have been implemented in libraries in the last ten years and what are the key aspects regarding the designs/frameworks. This study uses a content analysis approach to gain a deeper understanding of IL designs/frameworks discussed in research articles published from 2014 to 2023.

Methods

This section reveals the methods and steps used for this study (Figure 1). Currently, there are several bibliographic databases, such as Web of Science, Scopus, PubMed, and Google Scholar (free and commercial) available for searching research work. This study used Scopus for its comprehensiveness and ease of use. A search string for relevant research articles was conducted using Scopus on 02/03/2024. The search string used for identifying core studies is (TITLE("information literacy") AND TITLE(design* OR framework*) AND TITLE(library OR librari*)) AND (LIMIT-TO (LANGUAGE , "English")) AND PUBYEAR > 2013 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE, "ar")). A total of fifteen articles were identified and selected for inclusion in the study.

Content analysis, using both qualitative and quantitative approaches, was performed to examine the selected articles. A self-administered coding approach was undertaken, and each article was thoroughly read out by the authors of this study. Google Spreadsheets was used for entering and organising data gathered from 15 articles. The analysis includes the studies' basic characteristics, main objectives, research methods, applied IL designs and frameworks, target participants/groups, technological integration, and problems/challenges. The findings are presented in tables and charts using Google Spreadsheets and Voyant.
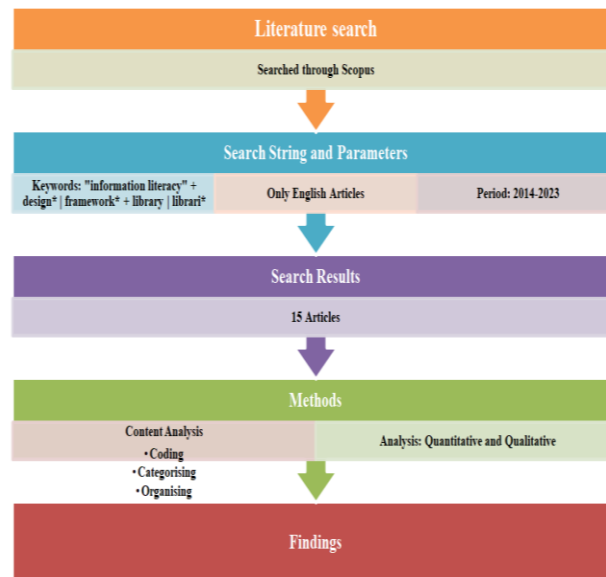

Fig 1: Study Methods and Steps

Findings of the Study

Basic Characteristics of the Articles

Table 1 shows that 2017 had the highest number of publications (n=3) within this field. The journals "College and Research Libraries News" and "Journal of the Medical Library Association" have been identified as the most common journals during 2014-2023, followed by "Library and Information Science Research," with two articles. Other journals listed in Table 1 have only one publication each. Melissa Gross, Heidi Julien, and Don Latham have two contributions to this field in 2018 and 2022. Most importantly, the authors co-authored both articles (Gross et al., 2018; Gross et al., 2022). There were 8 two-authored articles found, followed by three-authored (n=4). The rest of the articles were authored by single authors. The article of Gross et al. (2018) received the most number of citations (n=31) since its publication. In terms of journal citation metrics, "Journal of the Medical Library Association" received 46 citations in three articles. These findings provide valuable information regarding publications.

Table 1: Information of fifteen articles including authors, source titles, and citations

Authors	Sources/ Journals	Cit.	AP
Knapp & Brower (2014)	Medical Reference Services Quarterly	19	2
Porter (2014)	Internet Reference Services Quarterly	12	1
Guo & Goh (2016)	Library Quarterly	14	2
Willson & Angell (2017)	Journal of the Medical Library Association	20	2
Gregory & Higgins (2017)	Communications in Information Literacy	13	2
Schulte & Knapp (2017)	Journal of the Medical Library Association	20	2
Gross et al. (2018)	Library and Information Science Research	31	3
Baggett et al. (2018)	College and Research Libraries News	4	3
Crowe et al. (2019)	College and Research Libraries News	3	3
Brennan et al. (2020)	Journal of the Medical Library Association	6	4
Strader (2021)	Cataloging and Classification Quarterly	3	1
Gross et al. (2022)	Library and Information Science Research	6	3
Fuchs & Ball (2022)	College and Undergraduate Libraries	4	2
James & Filgo (2023)	College and Research Libraries News	1	2
Lessa & Leal (2023)	Revista Digital de Biblioteconomia e Ciencia da Informacao	0	2

Note: Cit.= Citations, AP=Authorship Pattern

Types and Objectives of the Articles (n=15)

This study found different types of research employed in the selected articles (Figure 2). Descriptive approaches (Knapp & Brower, 2014; Schulte & Knapp, 2017) were utilised to gather participants' data. Most of the studies (Porter, 2014; Guo & Goh, 2016; Baggett et al., 2018; Crowe et al., 2019; Brennan et al., 2020; James & Filgo, 2023; Lessa & Leal, 2023) employed mixed methods to combine both qualitative and quantitative approaches. In a study, rubric assessment (Willson & Angell, 2017) was used as a structured evaluation tool. Few studies followed qualitative approaches (Gregory & Higgins, 2017; Gross et al., 2018; Strader, 2021; Gross et al., 2022) to understand the core experiences and perspectives of respondents. Furthermore, specifically, one study conducted content analysis (Fuchs & Ball, 2021). These diverse research methods suggest that researchers took comprehensive approaches to present quantitative measurements and qualitative insights to address their research objectives.
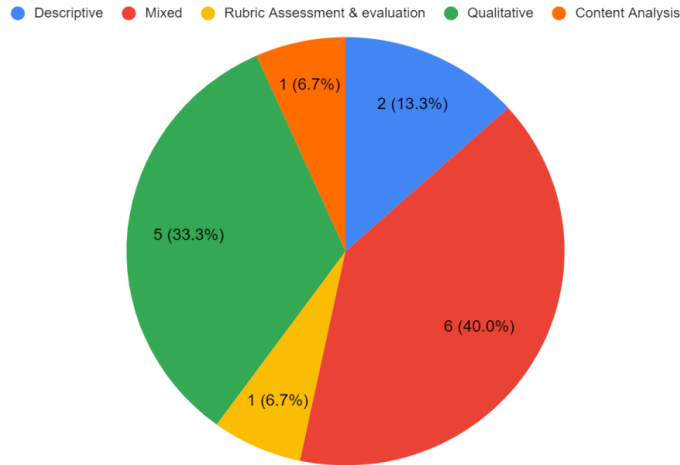
Descriptive   Mixed   Rubric Assessment & evaluation   Qualitative   Content Analysis

Fig 2: Types of studies

Table 2 shows the research articles' main objectives regarding various aspects of IL instructions and practices. Some objectives include assessing and improving the effectiveness of IL instruction, and pedagogical approaches (Porter, 2014; Willson and Angell, 2017) to evaluate student IL skill sets. Researchers assessed the adoption and application of IL designs/frameworks among different target participants (Schulte & Knapp, 2017; Gross et al., 2018; Baggett et al., 2018; Crowe et al., 2019; Brennan et al., 2020; Lessa & Leal, 2023). This indicates enhancing the quality and impact of IL designs/frameworks in diverse educational settings. On the other hand, exploring and revising the impact of the IL frameworks and standards was also done (Knapp & Brower, 2014). Furthermore, examining the alignment between the organisation of information, such as the cataloguing process and IL principles was framed (Strader, 2021). Implications of key IL frameworks amidst challenging situations like COVID-19 were investigated (Gross et al., 2022). One significant study explored one of the hottest topics– Generative AI's implications in the context of ACRL Framework for IL (James & Filgo, 2023). This indicates that the application of AI in IL programs has been elucidated. One study aimed to examine gaps between the ACRL Framework for IL in Common Core State Standards and the AASL Standards for learners and facilitate educators, and academic librarians for supporting students to become successful and information literate (Fuchs & Ball, 2021). These show theoretical understanding and practical applications of IL. These particular findings present the ongoing discourse on IL programs.

Table 2: Main objectives of the articles (n=15)

Authors	Objectives
Knapp & Brower (2014)	Analyse revised standards/framework's impact.
Porter (2014)	Discuss the approach to effective library IL instruction.
Guo & Goh (2016)	Develop IL game through a user-centered approach and sharing insights.
Willson & Angell (2017)	Assess IL skills among undergraduate nursing students.
Gregory & Higgins (2017)	Reorient IL programs toward social justice and student agency.
Schulte & Knapp (2017)	Focus on health librarians' new IL framework awareness, adoption, and application.
Gross et al. (2018)	Investigate librarians' pedagogical strategies for evaluating student learning.
Baggett et al. (2018)	Improve the assessment of student learning in IL.

Authors	Objectives
Crowe et al. (2019)	Assess the effectiveness of the ILFF program.
Brennan et al. (2020)	Facilitate the integration of IL into medical education.
Strader (2021)	Examine how cataloguing processes align with IL principles.
Gross et al. (2022)	Investigate ACRL Framework adoption and COVID's impact on information literacy.
Fuchs & Ball (2022)	Identify commonalities and intersections among ACRL Framework, Common Core State Standards, and AASL Standards for the 21st-Century Learners.
James & Filgo (2023)	Explore implications of using generative AI tools ACRL Framework context for IL.
Lessa & Leal (2023)	Understand IL levels of distance learning Library Science students.

Designs/ Frameworks and Target Participants

This section outlines two significant outcomes: the designs/frameworks (Table 3) utilised in various research articles and target participants. Several articles (Knapp & Brower, 2014; Gloria Willson & Katelyn Angell, 2017; Gregory & Higgins, 2017; Schulte & Knapp, 2017; Gross et al., 2018; Baggett et al., 2018; Gross et al., 2022; Fuchs & Ball, 2021; Lessa & Leal, 2023) prominently featured the Association of College and Research Libraries (ACRL) Framework for Information Literacy (Higher Education). It has been ascertained that the widespread adoption and influence of the framework in shaping information literacy practices within libraries. Furthermore, other studies (Porter, 2014; Y. R. Guo & Goh, 2016; Gregory & Higgins, 2017; Crowe et al., 2019; Brennan et al., 2020; Strader, 2021; James & Filgo, 2023) incorporated a range of theoretical frameworks and design methodologies, such as threshold concepts, student learning theory, user-centred design, participatory design, pedagogical design, and conceptual framework with AI. These approaches foreground a commitment to executing strategic instructions and cultivating a profound pact of IL perspectives. In addition, some articles (Gregory & Higgins, 2017; Crowe et al., 2019; Brennan et al., 2020; Strader, 2021; Fuchs & Ball, 2021) emphasised the importance of contextualisation and alignment with core values, campus initiatives, and curriculum mapping. These indicated a combined effort to integrate IL into extensive academic settings and contexts. This analysis presents important findings regarding various approaches to designing IL and characterising the integration of established frameworks.

Table 3: IL designs/frameworks used in the articles

Authors	Designs/ Frameworks
Knapp & Brower (2014)	ACRL (newly designed)
Porter (2014)	Threshold concepts, student learning theory, millennial research, flipped instruction, problem-based learning etc.
Guo & Goh (2016)	Participatory Design, Iterative Design, Balancing Enjoyment and Learning, Flexibility in Theoretical Frameworks, Accommodating User Input. User-Centred Design, Engagement, Usability, Learning Objectives Alignment, Iterative Development, Balancing Enjoyment and Learning, Flexibility and Adaptability etc.
Willson & Angell (2017)	ACRL, rubric development, assessment of inter-rater reliability, iterative refinement, and critical reflection.

Authors	Designs/ Frameworks
Gregory & Higgins (2017)	ACRL: Alignment with Core Values, Contextualization, Critical Pedagogy, Praxis and Reflection, Empowerment and Student Agency etc.
Schulte & Knapp (2017)	ACRL and conceptual framework
Gross et al. (2018)	ACRL
Baggett et al. (2018)	ACRL, Alignment with Campus Initiatives, Curriculum Mapping, Streamlining Assessment Methods.
Crowe et al. (2019)	ACRL: Collaborative Partnership, Active Learning and Participant Engagement, Stipends and Incentives, Assessment and Feedback, Long-Term Assessment and Continuous Improvement.
Brennan et al. (2020)	Five of six ACRL frames
Strader (2021)	IFLA Library Reference Model (LRM); The Framework for Information Literacy for Higher Education.
Gross et al. (2022)	ACRL
Fuchs & Ball (2022)	ACRL, Creation of crosswalk tools
James & Filgo (2023)	A conceptual framework for understanding the implications of using AI technologies like ChatGPT.
Lessa & Leal (2023)	ACRL

The data provided in Figure 3 indicates different participants. It was found that multiple studies surveyed more than one type of participant. First, Librarians (e.g., academic librarians, health science librarians) represent the most common group (n=12). This signifies the greater involvement in the research studies as participants (Crowe et al., 2019; Fuchs & Ball, 2022; Gregory & Higgins, 2017; Gross et al., 2018; Gross et al., 2022; Guo & Goh, 2016; James & Filgo, 2023; Strader, 2021; Brennan et al., 2020; Baggett et al., 2018; Knapp & Brower, 2014; Schulte & Knapp, 2017). It also shows a focus on the perspectives of librarians within the context of IL. Second, Educators comprised 5 studies (Fuchs & Ball, 2022; Willson & Angell, 2017; Gregory & Higgins, 2017; Guo & Goh, 2016; James & Filgo, 2023). They were emphasised based on IL abilities. Third, Students (e.g., undergraduates, post-graduates, nursing students, and LIS students) within a count of 5 studies, also played a significant role in the assessment process of IL frameworks (Brennan et al., 2020; Willson & Angell, 2017; Guo & Goh, 2016; Lessa & Leal, 2023; Porter, 2014). Students' understanding levels and experiences on the use of resources have been concentrated in the studies. Additionally, Researchers (Gregory & Higgins, 2017; Strader, 2021; Willson & Angell, 2017) account for 3 studies. A couple of studies gathered data from Faculties (Baggett et al., 2018; Crowe et al., 2019) and Instructional Designers (n=2) to evaluate the IL (Guo & Goh, 2016; James & Filgo, 2023). These infer the association of key stakeholders in the academic context. It can be said that the participation of individuals with special roles is also explored to comprehend the perspectives and skills of IL. Generally, this analysis reflects the involvement of stakeholders from different academic settings and an encompassing grasp of IL under the articles.
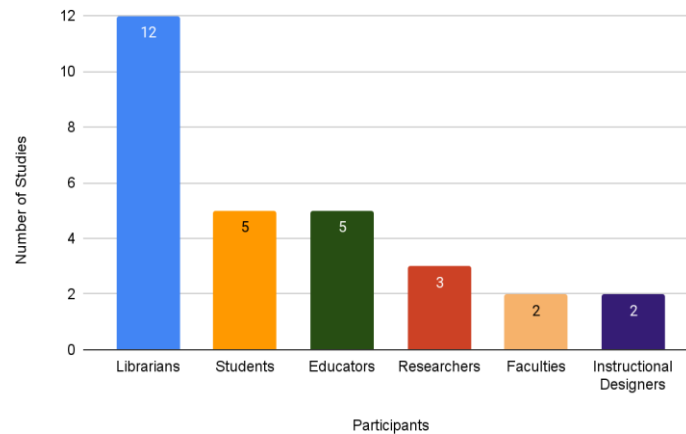
Fig 3: Participants' involvement in 15 articles.

Technological Integration

This study further identified technological integration with the IL. Articles mentioned various technologies to support IL skills. The most common integration was the "Online Platforms and Digital Resources." Examples include digital resources, online modules, tutorials, interactive learning platforms, databases, and collaboration tools (Knapp & Brower, 2014; Porter, 2014; Gregory & Higgins, 2017; Brennan et al., 2020). Similarly, the use of library management software, online assessment tools, data analysis tools, and instruction technologies, such as multimedia presentations and interactive whiteboards is likely utilised for delivering instructional content in a dynamic and visually engaging manner (Baggett et al., 2018). Synchronous communication tools such as video conferencing were used to integrate IL and engage academic librarians (Gross et al., 2018). Gamification can make the learning process more interesting. The development of a "Gaming app" for enhancing IL skills has been manifested. It can be more effective in engaging and interacting with learners (Guo & Goh, 2016). "E-survey" tools were employed in multiple articles (Schulte & Knapp, 2017; Crowe et al., 2019; Strader, 2021; Gross et al., 2022). Assessing users' needs and feedback is crucial for developing IL-related questions or evaluating the effectiveness of IL initiatives. The integration of "AI" into the Framework for IL represents a technological advancement in library instruction. It poses the connection of AI technology with IL principles (James & Filgo, 2023). For instance, to refine any research topic and research questions, ChatGPT can be used. It must be emphasised as a supportive aspect. Potentially, it can enhance IL skills and learning experiences. However, we need to be more cautious with its application.

Challenges/ Problems

This study elaborates on major problems/challenges to developing or applying IL frameworks (Figure 4). These are as follows:

Resistance to Change: Resistance to change emerged as a common challenge. There can be various forms, including disinclination in adopting new IL frameworks or instructional approaches.

Resource Constraints and Institutional Challenges: Limited resource is another significant challenge. It may include financial support, insufficient staffing and support for IL initiatives. Institutional challenges, such as resistance from academic stakeholders are found.

Technological Issues and Digital Literacy: Technology-related challenges are identified as major issues. For instance, implementation, integration, accessibility of technology, and digital literacy disparities are major issues involved in IL programs.

Time Constraints: Time constraints were other problems. These may include limitations on time available for IL instruction, curriculum integration, and access to participants.

Assessment Complexities: Issues regarding assessment design and implementation, developing strategies, and evaluating the effectiveness of instructional interventions are considered as a set of problems in IL.

Ethics: Data quality, ethical considerations, credibility, and reliability challenges, particularly in articles involving AI technologies need to be concentrated on contextualising IL programs.

Pedagogical Complexity and Faculty Engagement: This study found challenges related to engagement and motivation, pedagogical complexities, faculty engagement, and collaboration.

Interdisciplinary Nature: The complexity of interdisciplinary contexts was also discovered. This includes challenges related to aligning IL frameworks with diverse disciplinary perspectives and addressing varying levels of IL competency across different subject areas.

Contextual Factors: Contextual factors like the COVID-19 pandemic posed challenges for IL practitioners.

Others: This study found a few challenges that should be concentrated. For instance, consensus building, and integrating various IL standards and interpretation are identified. Addressing all these challenges is essential for the development and implementation of effective IL programs and initiatives in libraries.
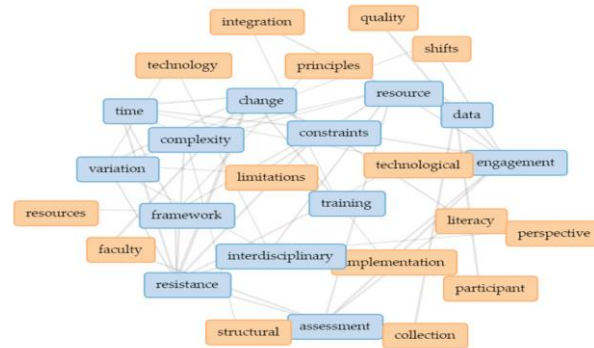

Fig 4: Problems/ Challenges faced in IL programs

Main Statements of the Articles

The main statements from the fifteen articles pivot on the use and implications of the ACRL Framework for IL in academic contexts (Table 4). The framework has been recognised as a potential tool for enhancing literacy in health science education and general education. However, there are challenges regarding the adoption, implementation, assessment, and awareness of IL designs/frameworks. Additionally, there is a call for new roles of library professionals to incorporate instruction on emerging technologies like AI. Lastly, this shows the progress of IL programs and the need for further exploration and advocacy in the field of IL.

Table 4: Main statements (concluding remarks) of the 15 articles

Authors	Statements
Knapp & Brower (2014)	New ACRL framework can offer the potential for improving literacy in health science education

Authors	Statements
Porter (2014)	The model supports personalised instruction and broadens information literacy.
Guo & Goh (2016)	Balancing user input and practical considerations in educational game design can enhance the learning process.
Willson & Angell (2017)	ACRL framework guides reliable assessment of IL skills. There is little evidence of the existence of rubrics grounded in the framework.
Gregory & Higgins (2017)	Linking the ACRL Framework with ALA Core Values to contextualise information literacy programs and the values of librarians.
Schulte & Knapp (2017)	There is a need to improve awareness and implementation of the ACRL Framework among respondents
Gross et al. (2018)	There is progress and challenges in the framework and further exploration is needed to address interdisciplinary variations.
Baggett et al. (2018)	Assessment informs plans to streamline data collection and enhance student evaluation.
Crowe et al. (2019)	The need for integration into the students' academic journey through "Information Literacy Faculty Fellows initiative" type programs for more contribution.
Brennan et al. (2020)	Mapping educational competencies of various health sciences disciplines to the ACRL Framework for broader advocacy and comparison of information literacy activities.
Strader (2021)	Information literacy and cataloguing rely on relationships.
Gross et al. (2022)	ILI can be better supported with a deeper understanding of their instructional landscapes and challenges.
Fuchs & Ball (2022)	Librarians should consider re-imagining their work for students' success in information literacy.
James & Filgo (2023)	Use of ACRL Framework to incorporate instruction on AI tools, emphasizing collaboration with faculty and sharing resources.
Lessa & Leal (2023)	Participants were critically competent in evaluating quality information.

Research Implications and Limitations

This study signifies its examination of different aspects of IL within libraries. Information regarding IL perspectives, designs/frameworks, and approaches are key features presented in this study. This study provides deeper information on the benefits and complexities of IL programs. For library and information professionals, it provides a practical understanding to enhance IL programs. On the other hand, policymakers can find the findings useful for shaping or restructuring policies. Researchers could benefit from its approach and do more exploration and collaborate with other stakeholders to implement IL programs.

There are some limitations in this study. This study is based on a single search parameter with a selected document type i.e. only articles indexed to Scopus. The scope of the study is analysis of the articles published from 2014-2023. This may lack its comprehensiveness. More search strings associated with IL can be used for future research. However, the results derived from the study are potentially useful and could be used for further research.

Conclusion

This study utilised a content analysis of fifteen research articles on IL designs/frameworks published during 2014-2023. Preliminarily, publications-related information, including year of publication, most active journals, and authors' contributions were analysed. Major findings revealed that descriptive research type was the most common across the articles, with main objectives often centred on implementing IL designs/frameworks to explore participants' perspectives and literacy skills. The ACRL Framework was highly used. The involvement of librarians and students as participants was mostly found in the articles. The integration of technologies like online tools and resources was also found. This study identified challenges such as resistance to change, resource constraints, and technological issues while implementing IL designs/frameworks. It also added the concluding remarks of those articles. Exploring these aspects emphasises the importance of continued exploration to address the effectiveness of existing designs/frameworks or approaching new frameworks.

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