Information Literacy Impact Framework

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Abstract. This paper presents findings from a scoping review of academic literature reporting on information literacy (IL) impact. It is intended to deliver considerations towards a framework for impactful IL interventions, including development of parameters to guide impact assessments. The study employed a systematic review methodology. From an initial set of 6177 candidates, a longlist for possible inclusion in the detailed review was developed and classified in three dimensions: geography, context and method of study. From this, a final sample of 26 items was evaluated, resulting in the identification of eight key components of impactful IL interventions, ranging from obtaining buy-in and collaboration, via using frameworks, to repetition to reinforce IL learning. A dominance of research in the education context carried out in Europe is noted.

Keywords: information literacy, impact, evaluation framework, success factors.

1 Introduction

Information literacy (IL) is essential for living and working in the modern age [1]. IL interventions aim to enhance IL capabilities, and it is believed that they have significant impact on society as they enable meaningful engagements with information across various settings [2, 3]

There has been much research into IL interventions in higher education [4, 5]. However, the impact of IL interventions across non-educational settings is not well understood.

There is a gap between the assumed and symbolic societal values of IL, and its proven value as an essential component of life in the Information Age. One source of this gap is uncertainty as to whether assessment of IL interventions' impacts should include both negative and positive effects; unintended and intended consequences; social, economic, cultural, environmental, or technological dynamics; and long-term and short-term processes [6, 7, 8, 9]. Hence a clearer definition of IL impact is needed, as is a coherent review of the existing and potential benefits of developing IL competencies in various aspects of daily life. The study reported here aimed to address these needs, using the following research questions:

1. How is impact defined in IL interventions?
2. What are the success factors behind impactful IL interventions?

In the study described here, 3816 papers published between 2005 and 2022 which self-identified as being relevant to IL, and which covered eight IL contexts across the world, were found. This list was narrowed down to 26 items for rigorous detailed review. From these, eight potential success factors for impactful IL interventions have been identified and evaluated. This is the first presentation of these factors to the academic IL research community, and will provide a framework for further research. This work is significant because of the potential to increase the practical impact of IL interventions by planning around these success factors.

2 Methodology

A scoping review was chosen to enable clarification of the concepts in the research questions, following the method of Tricco et al. [10] and three initial assumptions:

1. IL impact can be understood to be the outcome(s) of an IL intervention. This includes attitudinal and behavioural markers of impact, but does not include the development of IL skills. The formulation of IL impact used here pertains to observable phenomena.
2. While it is likely – and desirable – that learning will take place in interventions aimed at developing IL, IL interventions do not take place exclusively in formal education. Hence the searches described below were open to IL interventions in any context, including health, everyday life, and professional development.
3. Currently, there is no agreed way to measure of IL impact, so, IL interventions' outcomes may not always be presented or assessed as 'impact'. Therefore, flexibility has to be used when exploring the meanings of IL impact in practice.

The LISTA and Web of Science databases, which are known to cover this study's topics, were searched using keywords developed from the study aims and the initial assumptions. English-language outputs (including books and conference papers) published from 2005 onwards were considered for inclusion in the scoping review. Several filtering stages, shown in Table 1, were used to generate a 170-item longlist. The keywords were designed to find items describing the impact/outcomes of IL work. Hence the results contain items that self-identify as being in the IL domain. No attempt could be made during the process to evaluate the consistency of the results' IL definitions.

Table 1. filtering stages

Stage	Description
Development of keywords	Keywords were 'information literacy' AND any of 'assess', 'benefit', 'effect', 'evaluat*', 'impact', 'indicator*', 'measur*', 'monitor*', 'outcome', 'output', 'result'
Database searches and deduplication (N = 6177)	Two databases were searched: LISTA and Web of Science. Duplicate results were removed.
Focus on IL (N = 3816)	Results which did not have *information literac* in their title and/or abstract were removed.

Focus on relatively recent results (N = 3707)	Results from before 2005 were removed
Drawing up longlist (N=170)	Two reviewers independently reviewed the remaining items' titles and abstracts, looking for items that focused on impact. In this stage, a further 26 duplicates were removed. • If the reviewers agreed that an item focused on impact, it was included in the longlist. There were 135 such items. • If a reviewer found that an item was 'definitely' impact-focused, but the other found it was 'maybe' impact-focused, the reviewers discussed this item. Hence of 74 'definitely-maybe' items, 35 were added to the longlist. • If both reviewers found that an item was 'maybe' impact-focused, this item was not put in the longlist. There were 363 such item. • If either reviewer found an item was not impact-focused, it was excluded from the longlist regardless of the other assessment. There were 3109 such items.

Papers in the longlist were then categorized using three dimensions: **Geography**, **Context**, and **Methodology** (Table 2). The reviewers then independently assessed the longlist papers for significance, quality and rigor (SQR), each using a 3-point scale. (One point was awarded if a paper was assessed as reporting significant new findings; one point was awarded if a paper showed a high degree of research quality, such that research decisions were justified, and sufficient information on studies' objectives, conceptual frameworks, and interpretations was provided; one point was awarded if a paper was assessed as having used rigorous methods to gather and analyse data.) Those with the highest joint SQR scores became the final sample for the review.

Table 2. Longlist and final sample items' geographies, contexts and methods of study

Geography	Longlist	Final sample	Context	Longlist	Final sample	Method of study	Longlist	Final sample
Europe	38	12	Education	91	15	Quantitative	64	11
Americas	56	7	Library	22	3	Mixed	18	8
Africa	14	2	Workplace	11	3	Qualitative	20	4
Asia	18	4	Everyday	5	2	Literature review	9	0
Oceania	11	1	Health	10	2	NA/none	59	3
Global	4	0	Citizenship	3	1	--	--	--

NA/not stated	29	0	Con-ceptual	1	0	--	--	--
--	--	--	NA/not stated	27	0	--	--	--
Totals	170	26	Totals	170	26	Totals	170	26

Method of study: Three final-sample papers had no method of study but were kept because they contributed practicalities about IL interventions tackling fake news [11] and methods to evaluate IL impact [12, 13].

Geography: During generation of the final sample, the fraction of papers focusing on Europe increased (from 22% in the longlist to 46% in the final sample), and all 'global' papers were eliminated. The bias towards Europe over the Americas was somewhat surprising, as was a lack of research reporting on Asian and African contexts. This bias may have happened because good research may have been presented in ways that reduced the assessed SQR values.

3 Impact assessment, impact contexts and methodologies

Examination of the final sample showed that impact is reported, but formal and purposeful assessment of impact is rarely performed. Such impact assessment that is reported is most often found in institutions, in education [14, 15, 16, 17] and to a lesser extent in the library domain [18]. However, **long-term** impact is measured rarely [19, 20].

The only final-sample items that strongly consider how to assess the impact(s) of IL interventions are Crawford's chapter on this topic [21], and a critical review of IL assessment in higher education by Markless and Streatfield [12]. Therefore, the first key finding in this study is the general lack of evaluation and measurement of IL impact, despite the presence of much excellent IL work.

Differences between contexts were also observed. *Firstly*, the impact of educational IL interventions was demonstrated mostly as student learning and achievement indicators, such as greater use of suitable sources, improved recall and understanding, heightened critical thinking skills, and enhanced self-confidence associated with information use [15, 18, 19]. However, impact on student learning does not always lead to increased marks. [22]. *Secondly*, in library-focused studies, IL impact is seen in increased use of library facilities, and more positive perceptions of libraries [14]. Thus, the most immediate impact of IL interventions is on behaviours associated with using information. *Thirdly*, in workplaces, IL interventions have been seen to lead to improvements to organisational innovation [23]. IL also adds business value through increased information use and cultural changes [24]. IL also impacts the degree to which organisations adopt ethical practices [25]. *Finally*, in health/everyday applications of IL, impact is seen in increased readiness for self-directed learning and positive health outcomes [26, 27].

Concerning research methods, IL impact is most frequently assessed using quantitative and mixed methods. Qualitative methods are less frequently seen, yet appear in all IL context classifications. That is, they are not reserved for the assessment of specific

types of impact. The most frequently used methods to assess impact are surveys, observation, group discussion, interviewing, and phenomenographic methods [21, p. 211].

The following section develops these findings to identify the factors are likely to underpin effective IL interventions.

4 Towards an information literacy impact framework

This section responds to the project's two main research questions, identifying the key final-sample papers in each area.

4.1 Defining successful impact in IL interventions (RQ1)

In general, the final-sample shows that impact is evaluated, and hence defined not in terms of outcomes/effectiveness but by considering outputs/efficiency/'busyness'. For example, Daugherty and Russo [16] evaluated their project by assessing whether students used new skills but not whether this was led to with higher grades. Doney [18] evaluated increases in numbers of IL-education sessions, requests for literature searches, and books being issued to the nurses her service supports, rather than showing that healthcare outcomes had improved as a result of her IL intervention. Similarly, Howard and Gill [28] assessed whether their intervention led to increased use of their library, improvements in writing, increased use of document supply, heightened understanding of search, and greater use of IL tutorials [28]. Clearly some of these are not outcomes but merely outputs. The paper by Petrak et al. [29] is based on self-reported inputs: how useful course content was felt to be by attendees, how well-prepared lecturers were seen to be, lecturers' styles of presentation. While these may well be important precursors, they do not evaluate tangible impact in the form of, for example, improved healthcare outcomes.

4.2 The success factors behind impactful IL interventions (RQ2)

It had been assumed that all final sample items would report how impacts were generated and evaluated; this would have led to a simple set of success factors for IL interventions. In practice, this was not fully achieved because several papers omitted some or all of these details. However, it is possible to draw lessons from the results of the review. This was undertaken by performing a thematic analysis of the final sample items, in which *firstly* each paper was reduced to a few bullet points stating the paper's core meanings and any success factors for IL impact the paper conveyed. *Secondly,* if several papers covered a similar or identical success factor, these were brought together in drafts of subsections 4.2.1 to 4.2.8. *Finally*, rigorous re-reading of the relevant papers and the draft subsections enabled editing of the subsections into the findings presented below. Hence the following components of a proposed information literacy impact framework are evaluated in subsections 4.2.1 to 4.2.7, in relation to relevant papers from the final sample. Only one final sample item [26] clearly covered the interaction

of IL with an external factor (physical health) – see subsection 4.2.8. However, we do not believe that such factors should be ignored. The final list of success factors is:

- evaluation should be around effectiveness and outcomes (subsection 4.2.1)
- choice of clear frameworks and structures to measure impact (subsection 4.2.2)
- ensuring integration and relevance of the intervention (subsection 4.2.3)
- collaboration between stakeholders (subsection 4.2.4)
- design of content and delivery methods (subsection 4.2.5)
- repetition and follow-up (subsection 4.2.6)
- management buy-in and budget (subsection 4.2.7).

4.2.1 Evaluation should be around effectiveness and outcomes

Clearly it is necessary to understand the nature and extent of interventions' impacts. Markless and Streatfield [12, p. 113] strongly suggest that people running IL interventions do not simply collect 'busyness statistics' (i.e. outputs). These authors' final-sample items, and their book [30], provide clear suggestions about how to undertake impact evaluation. Streatfield and Markless [13] report an example of stimulating impact evaluation in university libraries. The 2017 paper notes the support for evaluation needed from stakeholders [12, p. 106], and can be read as a set of questions to aid planning of evaluation of IL interventions. The question-set covers three main areas: (1) the levels of expertise required; (2) inclusive approaches to impact evaluation; (3) the need for strong Theories of Change.

The other papers related to this aspect of evaluation illustrate these principles. Craig and Corrall [15] state that 10% of IL literature is concerned with assessment (assessment of learning) and evaluation (how effective interventions are). They state that while perceptive measures (e.g. self-efficacy) are often used, these measures do not objectively evaluate 'actual' IL. Kennedy and Gruber [31] reinforce this statement, as do Maranda et al. [20], who note that confidence is not related to knowledge. Crawford [21] also points out the paucity of assessment of IL interventions. He agrees that outcomes should be measured, using substantiated tools. Such outcomes include improvements to knowledge, and changes to perceptions and actions. Crawford further suggests collecting both positive examples of information-use and failures that might have been avoided. He recommends the books by Streatfield and Markless [30] and by Lipu et al. [32]. Seifi et al. [27] write about an example of measuring outcomes using an IL scale developed for a specific geography. This scale, from Jamali Mahmuei and Alizadeh [33] uses measures focusing on participants' post-intervention readiness for learning. Uzuegbu [34] provides a topical instance of 'IL instruction': simply informing rural villagers about sustainable development goals, but not taking concrete steps that would enable the villagers to work with such information. However, he notes that such instruction can stick in peoples' minds, leading to concrete actions to deal with non-biodegradable waste.

There are three warnings in the final sample papers' comments on evaluation. *Firstly*, Forster [25] states that it may not always be provable that interventions are effective. *Secondly*, Lee et al. [35] note that learners may be heterogenous; this implies

a need for nuance in evaluation. *Finally*, in Squibb and Mikkelsen's project [22], IL teaching did not significantly effect grade averages.

4.2.2 Choice of clear frameworks and structures to measure impact

Several final-sample items promoted the use of frameworks and structures to bolster IL interventions. Markless and Streatfield [12, p.113] state that strong Theories of Change are needed. They should link to clear, evaluable objectives that focus on changes to participants. Markless and Streatfield found that it was valuable to focus on single aspects. The intervention by Seifi et al. [27] was based on models by SCONUL [36] and Kuhlthau [37]. Seifi and colleagues used a scale devised by Kungu [38] to assess lifelong learning readiness, as well as the scale by Jamali Mahmuei and Alizadeh [33]. SCONUL's model [36] was also used in research by Craig and Corrall [15]. L. C. Chen and colleagues [19, 39] recommend requiring students to investigate and deliberate, using frameworks such as Big 6 and super3, and integrating such IL interventions into the curriculum. They state that such actions improve both recall and understanding of subject matter. These authors also call for ongoing interventions, and evaluation of their impact throughout school careers. Chen and colleagues' papers are the only longitudinal studies in the final sample. Kennedy and Gruber [31] work from the ACRL IL framework, using a protocol by Steinke and Buresh [40].

4.2.3 Ensuring integration and relevance of the intervention

IL is context-dependent [e.g. 41, 42], so IL interventions must be integrated into their contexts. This is seen in the following final-sample items. Ahmad et al. [23] recommend twice-yearly 'practice-based' workplace IL interventions. Craig and Corrall [15] recommend building IL training into work, while Cheuk [24] uses a workplace IL intervention to recommend integration with knowledge worlds. For Cheuk, interventions should be made useful, by enabling participants to learn. Crawford [21] calls for focus on specific matters such as health, finance, employability. Cullen et al. [43] state that IL education should be embedded into the curriculum. Hopkins and Julian [17] report on an intervention that went on through undergraduates' degree programmes, varying according to the students' study topics. It was found that IL intervention should take into account what students already know. Such interventions need time for both delivery and for learning to take root. Squibb and Mikkelsen [22] also state that IL instruction should be embedded in courses.

4.2.4 Collaboration between stakeholders

The following papers provide a little detail of how collaboration between IL intervention workers and others can be undertaken to integrate IL interventions into workplaces and teaching. Crawford [21] recommends collaboration around national policies. Lee et al. [35] state that interventions around use of government websites requires collaboration with data scientists, civil society organizations, local libraries and information agencies, and that such interventions should be domain-specific. Middleton's project [44] included collaboration between lecturers and library staff.

4.2.5 Design of content and delivery methods

Few of the papers describing interventions gave clear detail of their content and delivery to enable others to reproduce them. Auberry [11] advocates use of frameworks such as RADAR [45] but does not report any impact data to back this up. In contrast, Daugherty and Russo [16] thoroughly detail their intervention in an annex. Howard and Gill [28] advocate 'well-designed tutorials'. Kennedy and Gruber [31] call for service learning, in which 'students participate in an organized service activity that meets identified community needs and reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility'. Maranda et al. [20] report on IL instruction for first-year medical students that comprises three online modules, three in-person learning sessions and a therapeutics project. This is followed up with a second-year literature review project. Olaopa [46] shows that visually impaired learners suffer from low IL if they lack access to appropriate material (braille, audio-books etc.). A further consideration is learning styles. For example, Seifi et al. [27] note that older Iranians are accustomed to rote-learning rather than understanding, hence it is implicit delivery of IL outcomes will take time. Seifi and colleagues' training on use of public libraries has a curriculum of basic skills; recognition of the need for such skills; learning about information sources; learning to search the Internet and knowledge of resources; use of databases and library searches; learning about evaluating information and sources; learning about referencing and ethics.

4.2.6 Repetition and follow-up

Several papers advocate repeating or reinforcing IL interventions, because IL learning soon fades without such support. For example, Kennedy and Gruber [31] call for delayed post-testing as well as testing before and immediately after an intervention. Ahmad et al. [23] state that workplace IL training programmes should be conducted at least twice yearly. Y. H. Chen [14] built on models of technology acceptance [47] and successful information systems [48] to research training in use of a library portal. In this study, certain perceptions (ease of use, usefulness, information quality, system quality, service quality, satisfaction) and actual use of the portal were all increased by the end of the training, However, 3 months later only portal-use remained at a heightened level. Similar losses of learning were also found by Cullen et al. [43], and by Daugherty and Russo [16].

4.2.7 Management buy-in and budget

Another factor is the need for support from management, including budget. Ahmad et al. [23] showed that developing an innovation mindset needs investment in information-processing capabilities. SME executives 'should critically evaluate their awareness of the organizational information landscape', while enhancing their information capabilities. Markless and Streatfield [12] also consider the role of library leaders in delivering impact evaluation: they are concerned that leaders may concentrate on providing services and activities rather than assessing impact. In Cheuk's study of the introduction of an information system into a large environmental consultancy [24], the key step was

obtaining senior management buy-in, in the form of funding to enable integration of the intervention throughout the consultancy's practices. Craig and Corrall [15] also demonstrate the need for buy-in, not least in supporting relevant testing. Doney [18] states that her intervention would not have taken place had her manager not asked for it, and provided funding. Hopkins and Julian [17] also report on the need for buy-in from management and others. Seifi et al. [27] state that development of IL needs societal change, which might be seen as 'societal buy-in', and budget/infrastructure.

Uzuegbu [34, p. 92] writes about a form of senior buy-in in that a village chief banned certain environmentally damaging activities three months after Uzuegbu's intervention. The chief learnt of the implications from one of his staff who took part in the intervention.

4.2.8 Interaction with external factors

Hirvonen et al. [26] show that for young Finnish men called up for national service, lower everyday health IL (EHIL) scores are more frequent among those over 18 years old, undertaking or having completed compulsory or vocational education, not in higher/further education, or having a father who works or worked in a manual labour occupation. Similarly, those who had unhealthy lifestyles had lower EHIL scores. The converse was also found, i.e. those with low EHIL scores were less likely to behave in health-promoting ways. Hence it is possible that IL and external factors interact with each other.

5 Conclusion and next steps

This study of self-described IL literature has shown that there is inconsistent impact assessment, along with poor use of evidence. This is despite several authors having undertaken thorough work towards a roadmap for assessment of IL impact.

Overall, there is a dearth of IL impact assessment in educational and library contexts. Hence, more research is needed into the impacts of workplace, everyday, health, and citizenship IL interventions. Another significant literature gap is the world away from Europe and the Americas. This may reflect a weakness in this study's methods, so there may be a range of publications in other languages. However, given the wide scope of the study's searches, it is also likely to reflect real research gaps.

The future of IL impact evaluation is open, and is likely to be shaped by external demands and recent developments [12]. The findings presented here support Markless and Streatfield's call [12, p. 106] for systematic, theory-based approaches to impact evaluation, and show that there is much to do to improve such studies.

There are some limitations to this review, leading to options for further work. *Firstly*, reliance on the review items' definitions of IL (often not explicitly stated by their authors) means that inconsistency is possible. Hence there is scope to research how publications in this domain define IL, and to consider how the IL definitions in the final sample items may have affected this review's findings. *Secondly*, further research may find evidence of other forms of impact, such as through collaboration. *Thirdly*, there may be structural barriers that prevent IL interventions being successful, but no items

covering this possibility came up in the searches. *Fourthly*, only English-language publications were considered, presumably contributing to the geographical biases noted above. *Finally*, this study was a literature review. Empirical work is needed to test and evaluate the potential success factors listed above.

In summary, this study has shown that more could be done to assess the impact of IL interventions globally. It is suggested that the above IL impact framework should be developed, building on the contextual and methodological differences found, and moving beyond Europe and the Anglosphere. This work should be flexible and inclusive enough to be applied across a variety of contexts, and should establish methodological and conceptual standards for IL impact assessment that draw upon a wide range of resources (for example, LIS literature; impact assessment standards and models from other disciplines). The resulting improved framework should then be validated, using suitable case studies, and reference to well-known works on development of impact, such Meyer et al.'s Toolkit for the Impact of Digitised Scholarly Resources [49], Verwayen et al.'s Impact Playbook [50] and Tanner's Balanced Value Impact model [51]. The authors of this study look forward to collaborating with others to undertake such work.

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7 References

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