

# Information literacy in health sciences education: proposal of a new model in a multi-perspectivism setting

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## Abstract

*Information literacy (IL) has become a core skill within health sciences education. Curriculum developers invest a lot of energy in the development of curricula to integrate IL training in an effective way. To optimize this implementation, a new IL model for health sciences education in a multi-perspectivism setting is proposed. Information literacy should be integrated and practiced within a complete curriculum by using horizontal (basic IL skills) and vertical integration (IL integrated within the discipline) that would guarantee equal opportunities for students' IL development and which could be a more cost-effective solution within curriculum development. The emerging technologies and the impact on educational models will more and more demand different expertise and thus collaboration of experts with different backgrounds.*

**Key words:** information literacy; health education; evidence-based practice; libraries, medical and problem-based learning.

## Introduction

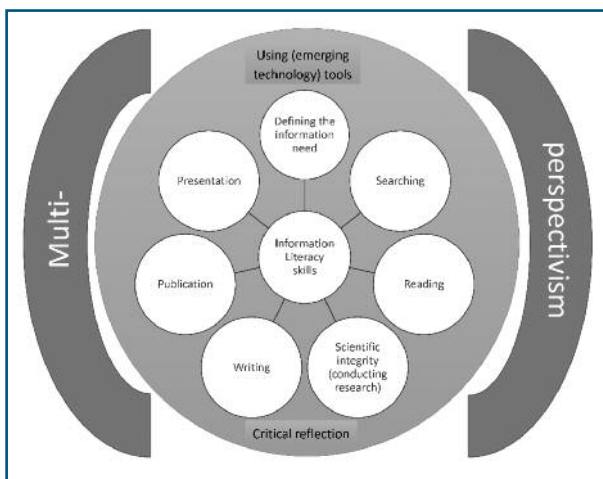
Information literacy (IL) has been introduced as a concept by Zurkowski (1) suggesting that information sources should be used in the working environment. In 1989, the American Library Association (2) described IL as “a set of abilities requiring individuals to recognize when information is needed and having the ability to locate, evaluate, and use effectively the needed information”. Shapiro and Hughes (3) distinguished in 1996 different IL-related dimensions in a curriculum: tool literacy, resource literacy, social-structural literacy, research literacy, publishing literacy, emerging technology literacy and critical literacy. Recently, in 2016, the Association of College and Research Libraries (ACRL) (4) adopted a “Framework for Information Literacy for Higher Education” proposing a new expanded definition of 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”. Information literacy has become a core component of lifelong learning (5, 6) and is common for all disciplines, learning environments and levels of education (7). It can further be seen as the basis for

evidence-based acting (8) and is thought to enhance student learning (9, 10). It is therefore considered as an essential component of the academic curriculum (9, 10) and a mission of universities in current society (11, 12). Even though IL training should already be incorporated early in the curriculum (13), it should not be limited to those first years. It needs to be developed throughout a complete curriculum to make sure students improve continuously and retain their acquired IL skills (14). In the curriculum, IL training should take place at contextually and appropriate key moments (15). Besides training, assessment of IL skills at different time moments throughout the curriculum, has been considered equally important (16, 17).

## Proposal of a new model for information literacy in health sciences education in a multi-perspectivism setting

Specifically focusing on higher education, SCONUL proposed a model based on seven pillars: identify, scope, plan, gather, evaluate, manage, present (18). Partially based on this model, the dimensions proposed by Shapiro and Hughes (3) and the experience of an expert IL-teacher, a new model has been proposed (Figure 1).

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**Fig. 1.** Model showing the different dimensions of information literacy at health sciences education in a multi-perspectivism setting.

In this model different dimensions can be distinguished. Two dimensions interfere with almost all other dimensions proposed. All health science students should know how to *use (emerging technology) tools*. Even though students know how to use social media, know how to Google, they not always possess basic skills such as those needed to hand in a well-formatted paper or to use basic MS-Excel functions (*Table 1*). When those skills are lacking, students need to get the opportunity to learn and practice these skills at the beginning of the academic year. The addressed topics should be well-written and at forehand communicated; so only students having the feeling they lack those skills, could come to these sessions. Also, attention should be drawn to institution-specific ICT-related aspects, as students have to learn to use the institution-specific learning

<b>Basic IL-topics addressed by the expert IL-teacher</b>	
<b>Use (emerging technology) tools</b>	
MS Word	cover page header / footer table of contents using CTRL-function
MS Excel	formula cell-locking automatic filling of cells generate figure
<b>Critical reflection</b>	
Define key-words Check MeSH/Emtree definition Dare to reflect about search strategy by e.g. copy-pasting a key-title to another database to look at the Emtree/MeSH linked at that article. If new key-terms emerge one should have the reflection to adapt their search strategy Peer review	
<b>Defining the information need and searching</b>	
Rewrite clinical question into PICO	
Extract/define key-words	
PubMed	free text searching analyse automatic term mapping MeSH Major Topic Heading No explode (MeSh terms below the term in the MeSH hierarchy) Defining time period Gaining insight in consequences of using filters
Embase	quick search Emtree search Use of Major focus / explosion / ... PICO-search use of filters (disease) query builder
Web of Science	general search citation-related searching interaction between databases
PRISMA-flowchart	
<b>Searching / Writing</b>	
Use efficiently bibliographic software	

**Table 1.** Basic IL-topics addressed by the expert IL-teacher.

platform. It is therefore of utmost importance that a close interaction exists between IL-teachers and the ICT-department to encompass software-related problems (e.g. running software on own portable PC's, etc.). Addressing these basic skills could possibly be (partly) the base for students to start with equal opportunities.

Another dimension interfering with all the other dimensions is *critical reflection*. This skill – as is the previous defined one – should be integrated throughout all other dimensions and be taught (19) throughout various topics/disciplines.

*Defining the information need and searching* are two dimensions closely related to each other. Nowadays, students are confronted with a large amount of (scientific) – above all digital available – information. For novice searchers it is difficult to define and search for 'coherent' information. Also, in the context of Evidence-Based practice, it is crucial to know how to formulate well-built questions (20). Learning to define the information one needs, is an important skill which helps to distill key words and thus search for this information. PICO (Problem/Population, Intervention, Comparison, and Outcome) could facilitate this search process (21). Students have to learn to rewrite a search question into PICO. They further need to learn how to search efficiently in a structured way when making use of domain-specific databases. They should know how to search in PubMed, Embase, Web of Science, and Google Scholar (Table 1). Students have to learn to be critical and to dare to reflect about their search strategy by e.g. copy-pasting a key-title to another database to look at the Emtree/MeSH linked at that article. If new key-terms emerge they should have the reflection to adapt their search strategy. It is therefore also important to gain insight in the publication process, know the basics about how domain-specific databases work; what the pros/cons are of these databases, and so on. Already early in the curriculum, students have to learn and practice the process of narrowing/widening an original search question. In an ideal situation, they have to write a search-report starting from a rather broad (own-chosen) health topic. Based on their strategy, they

should end-up with a well-demarcated health question accompanied by at least three (recent) articles (22) in which they have filled in the first parts (identification/screening) of the PRISMA-flowchart (23). Once they have more domain-specific knowledge and more specifically when they have to write their thesis, they should have developed these skills and be able to apply them for their own scientific work. At the end of their master years, students should be able to write a structured narrative review.

Alongside with searching, retrieval and management of literature is equally important. Learning how to use efficiently *bibliographic software* should be integrated in this learning process. Once literature has been found, students should be able to critically *read/interpret* this information, a skill that needs to be developed throughout the curriculum. They further should learn strategies to structure and easily integrate information from diverse authors, e.g. writing a paper. Students need to be able to critically appraise literature, to make the link with own study topics, research etc. This includes learning to recognize bias, gaining insight in methodology of scientific research and in biostatistics.

*Being able to conduct research*, based on *scientific integrity*, is another important component of academic health education. In this fast evolving (technical/technological) world, it is crucial that students are confronted with the different research-specific components and processes. Learning to write a data management plan should be integrated into the curriculum and part of the thesis.

Also, *writing, publishing* and *presenting* are skills that need to be practiced throughout the curriculum. At the moment that students need to write and present their thesis, they should have acquired already some basic skills.

### Horizontal and vertical integration

Information literacy should be integrated as a core ingredient of the academic curriculum both vertically and horizontally which could enhance the multi-perspectivism view. Vertical integration – as showed in Figures 2 and 3 – enables students to practice the different skills on different levels so these skills are continuously activated, stimulated and become retained. However, most of these skills

are not course-specific, especially not in the first years of the academic studies. Therefore, learning of the different basic IL-skills lends itself well for horizontal integration (Figure 2).

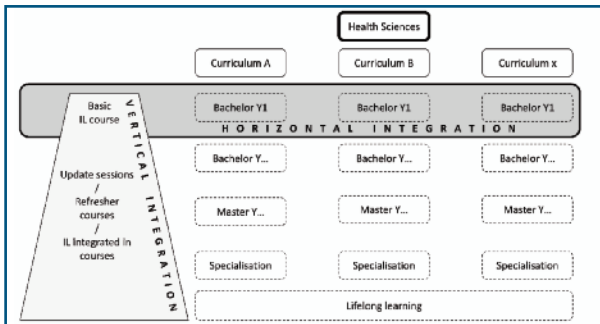


Fig. 2 Horizontal and vertical integration of information literacy skills.

As proposed before, already early in the curriculum students should have a practical integrated course covering basic IL-skills. Writing a personal search paper is possibly the best basis for integration of these skills and is highly recommended (22).

Information literacy teachers should therefore have up-to-date personal knowledge and experience in developing IL. They should be available for intermediate feedback sessions to help students when struggling with IL-related questions. They also should evaluate the search papers and provide students with personal feedback. Setting up a system of interdisciplinary peer-review (based on well-defined early-provided items) could possibly be of extra help for students to reflect on their personal search paper. In the following years, IL should be continuously activated by means of update and refresher courses and should become integrated into more domain-specific courses. Especially horizontal integration of the model and implementing teach-the-teacher training sessions could possibly be cost-effective as skills are transferred in an efficient way. Students would receive the same basic instruction. Via teach-the-teacher sessions, lecturers receive up-to-date information on new IL insights (e.g. new search strategy, database, etc.) which could help to integrate IL-skills into more domain-specific areas. Information literacy-assessment

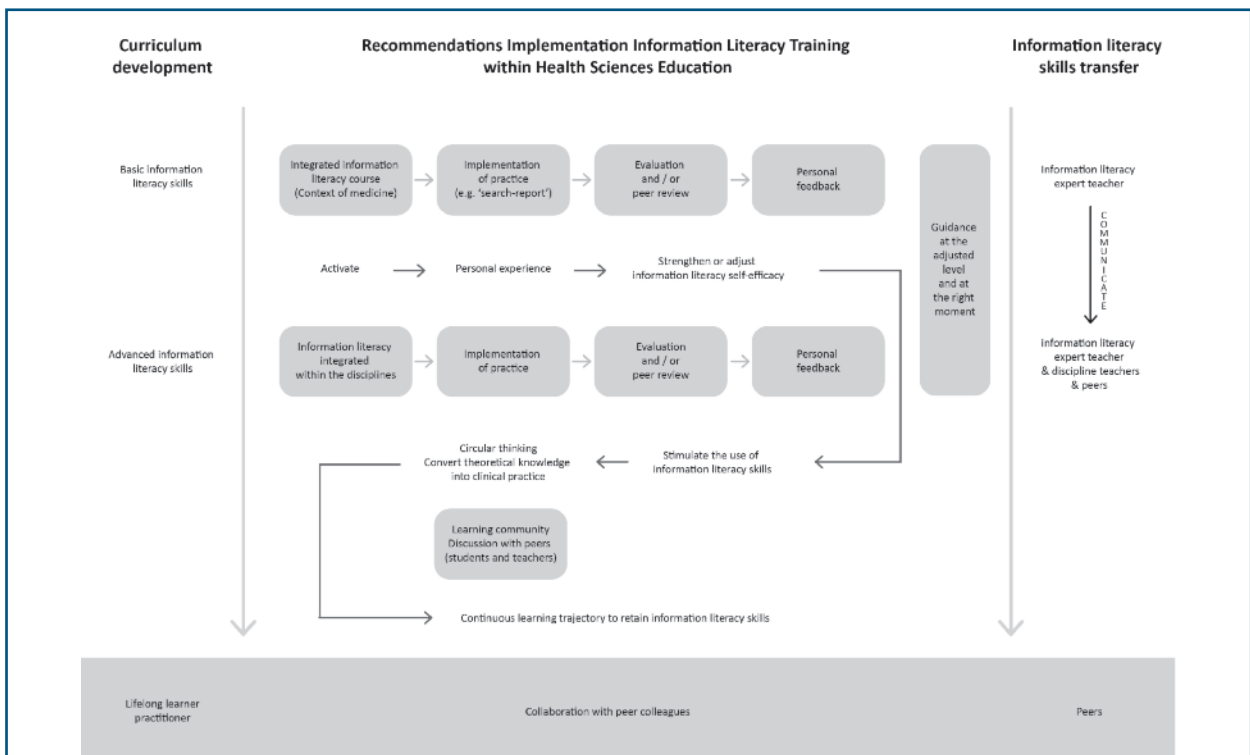


Fig. 3. Recommendations for the integration of information literacy training within health sciences education.

should however be foreseen at different moments alongside the curriculum (16, 17). When writing a paper, (interdisciplinary) peer-evaluation, with attention to more advanced IL-related items, can be set-up. Information literacy should therefore be integrated into the curriculum as a continuous learning trajectory enabling teachers going gradually into more depth so students are stimulated to progress (Figure 3).

### Conclusion

In this paper a new IL-model in a multi-perspectivism setting in health sciences education has been proposed. This model encompasses different equally important dimensions. Students should learn, as much as possible through practical-integrated courses, to define the needed information, to search and read, write, publicize and present. They should know how to conduct research and take into account scientific integrity.

Knowing how to use emerging technology tools and being critical are two cross-dimensions interfering with the other ones. A basic IL-course should be foreseen in the first year ending-up with a personal written search paper with interdisciplinary peer-review. As these basic skills are equal for all novice health students, horizontal integration is advised. Because IL should be continuously activated throughout the curriculum, students should get the opportunity to practice those skills in more domain-specific courses (vertical integration). A prerequisite, is to foresee in update and refresher courses and to provide teach-the-teacher sessions. Collaboration with experts from different backgrounds will become more and more important.

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