Development Information Literacy taxonomy

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Introduction
In the Netherlands, Libraries from institutions for higher education (both universities and universities for applied sciences) worked together in sharing Information Literacy (IL) materials via Surfsharekit, a nationwide OER platform. To be able to share and find these IL materials more effectively a taxonomy for IL has been developed. Furthermore the taxonomy are used as a foundation for creating Edubadges, open badges/microcredentials to be used nationwide in the Netherlands.

Analysis of content and processes – comparison of standards
The taxonomy is the result of a comparison of Information Literacy standards/frameworks. Worldwide several models are being used, the purpose of all of them is to map the Information Literacy discipline. Each model has its own mapping/classification. Many frameworks describe Information literacy competences dealing with the required skills (action focused) along with aspects of attitude. Most of them follow (more or less) a step by step action plan, starting with orientation on the subject and ending with presenting/publication/communication. A few standards do differ from this step by step approach:

- The ACRL Framework uses six frames and does have a more conceptual approach. Many different concepts apply to multiple steps in the search process.
- Apart from the required skills and attitude aspects Kuhlthau (2004) describes thoughts and feelings of the researcher as well during the different phases of the search process.
- The metaliteracy model (Mackey & Jacobsen, 2014) includes metacognitive, cognitive, affective and attitude aspects.

Although there are clear differences in the approach used in the different models there is also a lot of overlap. After all they are all dealing with the same, admittedly fast developing, discipline of Information Literacy. To come to a generally applicable taxonomy we looked at the common denominators in the different models (shown in figure 2). The fact that the six frames of the ACRL framework are applicable to more steps in the search process, is indicated by showing the colors of the related steps of the taxonomy in every concept/frame. A lot of knowledge/skills and consciousness aspects transcend the search process and should actually be learnt prior to searching. Therefore we added a facet 'Orientation on information landscape' as a first step of the taxonomy.
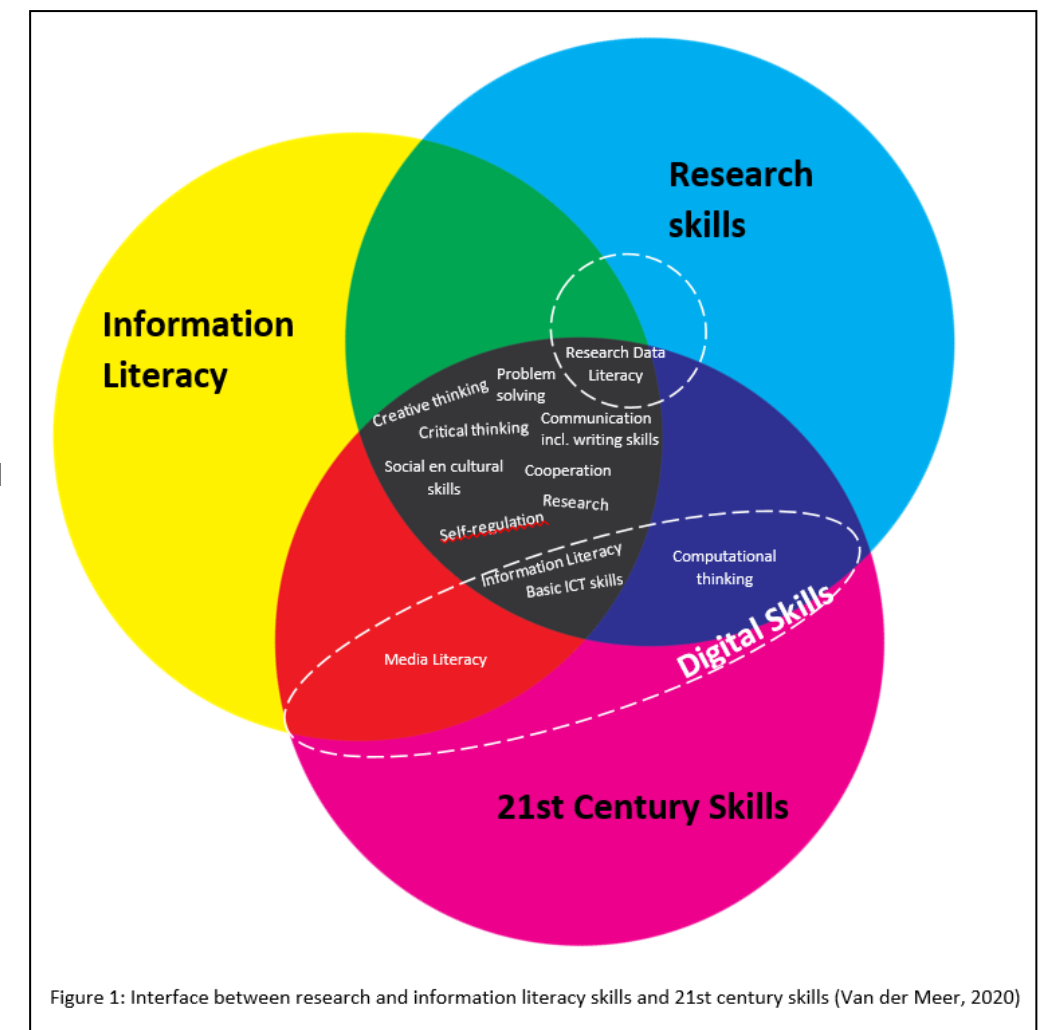
Exclusion of the comparison analysis
The taxonomy – as a result of comparing the information literacy standards – does not contain all aspects:
- As mentioned before, a couple of non-action focused aspects (e.g. metacognitive, cognitive, affective and attitude aspects) are essential in teaching information literacy. Nevertheless they are disregarded in the comparison analysis. The reason is that in most cases these aspects are very important but, they are part of a didactical approach and linked to several parts of the search process. For the time being it is not to be expected that there are educational materials exclusively dealing with these aspects/goals. Therefore, these aspects did not result in specific facets, instead we tried to map free keywords to point out this aspects.
- The discipline Information Literacy does have overlap with other skills/literacy-areas like for example 'Research skills' (and Research Data Management (RDM) - Research Data Literacy (RDL) as a part of it) and the 21st Century Skills (see figure 1). Our IL taxonomy doesn't explicitly include these elements. It should be noted that educational materials related to data could fit in the current structure if needed by replacing the term 'information' with ' data'. The 21st century skills are implicitly part of attitude and/or skill aspects that are important in the teaching of information literacy (like the other metacognitive aspects mentioned before). They are not recorded as a facet but could be added to an educational material as (free) keywords .

Facets and keywords
Card sorting software has been used to test if the facets of our IL taxonomy are clear enough, if no facets were missing or if the facets should be named otherwise. During the card sorting process, a test group of subject librarians placed keywords in what they felt was the right predetermined facets of the taxonomy. Linked to this activity the test group filled in a questionary concerning the usability of the taxonomy. Additionally a few colleagues working with the ACRL framework have been consulted to make sure that the taxonomy is suitable for their educational materials. The tests led to several adjustments in the IL taxonomy. The final version of the IL taxonomy is included in the last columns of figure 2 and is visualized in a mindmap in figure 3. Examples of possible keywords for each facet can be found in figure 4 even though free keywords are used in sharing educational materials.

Figure 1: Interface between research and information literacy skills and 21st century skills (Van der Meer, 2020)

Sconul (derived from RDF) link	ACRL Framework link		CILIP link	Australian & New Zealand IL Framework link	Kuhlthau Model link	UNESCO link	Metaliteracy characteristics (Mackey & Jacobsen, 2014)	Common denominators	Taxonomy	Level 1	Level 2	Level 3

Sconul (derived from RDF) link	ACRL Framework link	CILIP link	Australian & New Zealand IL Framework link	Kuhlthau Model link	UNESCO link	Metaliteracy characteristics (Mackey & Jacobsen, 2014)	Common denominators	Taxonomy — Evaluation process	Taxonomy Level 1	Taxonomy Level 2	Taxonomy Level 3
1. Identify Recognize information need	**Research as inquiry**	**1. Need for information**	**1. .. recognises the need for information and determines the nature and extent of the information needed**	**1. Initiation**	**1. Realize that a need or problem exists that requires info. for its satisfactory resolution**	**Stel vast**	**Determine information needs**		**1. Orientate and specify** ?	● Orientation on information landscape	● Value of information/data ● Nature and appearance of information/data ● Functioning and structure of the internet ● Role and creation of networks ● Individual in the information landscape
2. Scope Assess current knowledge and identify gaps				**2. Topic Selection**	**2. Know how to accurately identify & defi ne the info. needed to meet need or solve problem**		**Determine gaps**			● Identification of information needs	
	Information has value			**3. Prefocus**			**Orientative search**			● Search for information	
				4. Focus Formulation Based on gathered information	**3. Know how to determine if the needed info exists or not, and if it does not, go to Stage 5**		**Formulate (re)search questions**			● Formulation of a research question	
3. Plan Construct strategies for locating		**2. resources available**	1.4 uses diverse sources of information 2.1 selects appropriate methods or tools 2.2 constructs and implements effective search strategies				**Plan / set up search strategy**		**2. Plan and search**	● Selection of information resources and search systems ● Selection of search terms	
							Determine information resources				
4. Gather Locate and Access	**Searching as strategic exploration**	**3. Find information**	**2. .. finds needed information effectively and efficiently**	**5. Collection Focused search**	**4. Know how to fi nd needed info. if known to exist, and then go to Stage 6**	**Verkrijg toegang**	**Search**			● Search for information	
5. Evaluate Review research process and compare and evaluate info + data	**Authority is constructed and contextual**	**4. Evalueer resultaten**	**3. .. critically evaluates information and the information seeking process**		**7. Know how to organize, analyze, interpret, and evaluate info., including source reliability**	**Evalueer**	**Select / assess / evaluate results**		**3. Critically assess** ☑☑☐	● Critical assessment of search results	● Information processing (read, listen e.g.) ● Assessment criteria relevance/reliability
					6. Know how to fully understand found info., or know where to go for help if needed to understand					● Critical evaluation of search process	
6. Manage Organize info professionally and ethically		**8 Beheer je bevindingen**	**4. ..manages information collected or generated**		**10. Know how to preserve, store, reuse, record and archive info. for future use**	**Gebruik**	**Organize / process**		**4. Organise and process**	● Organisation of process and search results	
						Begrijp				● Cooperation (in teams)	
		6. Ethiek en verantwoordelijkheid in gebruik			**11. Know how to dispose of info. no longer needed, and safeguard info. that should be protected**	**Verwerk**	**Ethical use of information**			● Analysis of search results	
										● Use and processing of information (ethically)	● Acknowledgement of sources ● Copyright ● Privacy-sensitive information
7. Present Apply knowledge gained: presenting results, synthesis and create new knowledge	**Scholarship as conversation Scholarship as conversation**	**7. Commu-niceer en deel informatie**	**5. applies prior and new information to construct new concepts or create new understandings**	**6. Presentation**	**8. Know how to communicate and present info. to others in approp./ usable formats/ mediums**	**Werk samen**	**Present/ communicate**			● Synthesis or creation of new information	
						Participeer			**5. Publish and communicate**	● Publication of product	
			6. .. understanding and acknowledges, cultural, ethical, economic, legal, and social issues surrounding the use of information		**9. Know how to utilize info. to solve problem, make decision, or meet need**	**Deel**				● Communication of product	
	Information creation as a process	**5. (Hoe te) werken met resultaten en ze te exploiteren**			**5. Know how to create, or cause to be created, unavailable info. (i.e. create new knowledge)**	**Publiceer**	**Synthesize use / create new knowledge**			● Valorisation of findings (outreach)	

Figure 2: Information Literacy taxonomy– comparison of IL models (Van der Meer / Post, 2020)
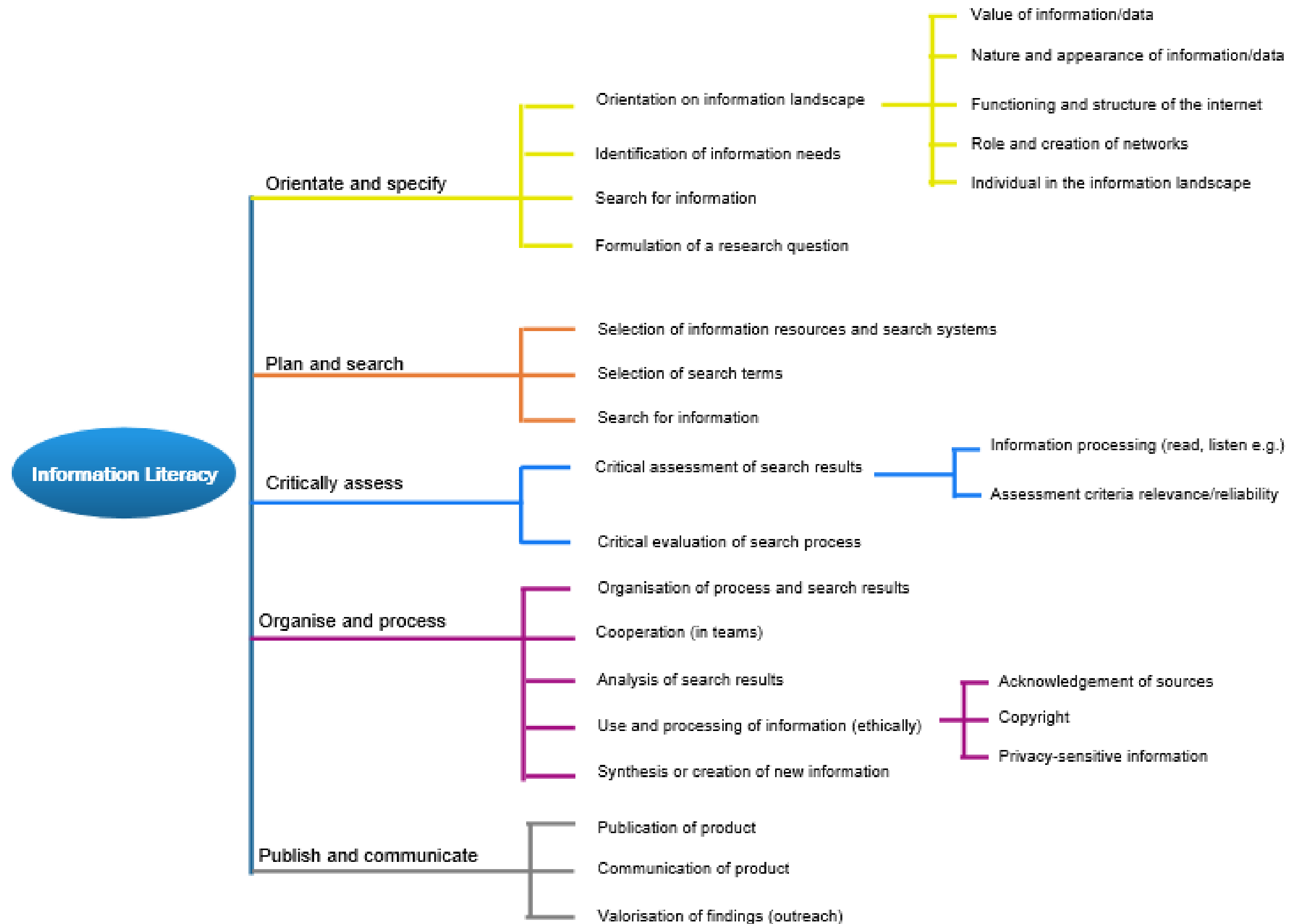
Figure 3: Information Literacy taxonomy – schematically display (Van der Meer / Post, 2020)

CLASSIFICATION - GOAL	TAXON (BUILDING-UP STRUCTURE)	LEMMA LEVEL 1	LEMMA LEVEL 2	EXAMPLES OF KEYWORDS
INFORMATION LITERACY	Orientate and specify	Orientation on information landscape	Value of information/data	access; big data; critical thinking; data; detox; digital footprint; fake news; information access; market value; media literacy; peer review; privacy; personal information; revenue model;
			Nature and appearance of information/data	articles; background information; bibliography; books; factual information; full text; handbooks; images; newspaper articles; news magazines; newspapers; references; primary sources; thesis; reviews; summaries; secundary sources; statistical information; tertiary sources; magazine articles; journals; magazines; subject-oriented information; trade magazines; videos; websites; scientific information; dictionaries; media formats;
			Functioning and structure of the internet	Google; internet; websites; search engines; search systems; algorithms; spiders; world wide web; ranking; SEO; search engine optimisation; technology; artificial intelligence; semantic web; metadata; connectivity
			Role and creation of networks	Social media; networks; professional communities; scientific networks; Facebook; instagram; pinterest; linkedin; Research Gate; Academia; interactivity;
		Identification of information needs		Setting limits; information needs; jargon; literature search; deskresearch; mindmap; subject specification; orientation; key concepts; components; problem solving;
		Search for information		Background information; bibliography; library catalogues; catalogues; databases; directories; encyclopedia; google; google scholar; internet resources; handbooks; information resources; jargon; newspapers; newspaper articles; Nexis Uni; references; subject specification; orientation; reference lists; search results; reviews; backward chaining; statistical information; subject-oriented information; trade magazines; videos; websites; Wikipedia; dictionaries; search techniques;
		Formulation of a research question		Setting limits; sub-questions; main questions; jargon; research questions; information problem; components; key concepts; search questions; problem solving;
	Plan and search	Selection of information resources and search systems		reliability; library catalogues; sources; resources; catalogues; databases; directories; google; google scholar; informative resources; internet resources; internet sources; Nexis Uni; Pubmed; thesauruses; websites; Wikipedia; search entries; search engines; search strategies; search systems; open data; Open Educational Resources; OER; Merlot; OER Commons;
		Selection of search terms		antonyms; broader terms; related terms; jargon; mindmap; narrower terms; pearl growing; components; key concepts; thesauruses; keywords; dictionaries; search strategies; search terms;
		Search for information		quotation marks; Abstracts; alerts; antonyms; asterisks; library catalogues; Boolean operators; building blocks; broader terms; catalogues; directories; simple search; exact phrase; advanced search; related terms; proximity operators; narrower terms; pearl growing; queries; precision and recall; serch results; summaries; backward chaining; synonyms; thesauruses; key words; truncation; limitations; wildcards; search entries; search engines; search methods; search strategies; search systems; search techniques; search terms; search fields; search queries; search terms; search filters
	Critically assess	Critical assessment of search results	Information processing (read, listen e.g.)	Abstracts; summaries; read; listen,
			Assessment criteria relevance/reliability	Abstracts; actualiteit; Altmetrics; authority; reliability; verifiability; evaluation; fake news; factual information; objectivity; peer review; precision and recall; references; relevance; search results; summaries; websites; search logbooks; critical thinking;
		Critical evaluation of search process		Evaluation; logbook; process evaluation; critical thinking; self-regulation; self-reflection; metacognition;
	Organise and process	Organisation of process and search results		Alerts; APA; citations; citation management; Endnote; export; Harvard; reference lists; logbooks; Mendeley; reference managers; Refworks; search results; Vancouver; search logbooks; Zotero;
		Cooperation (in teams)		Social media; coopertion; division of roles; co-creation; professional communities; creative thinking; weblogs; wiki; team based learning;
		Analysis of search results		Search results; analysis; critical thinking;
		Use and processing of information (ethically)	Acknowledgement of sources	images; APA; copyright; sources; quotation of sources; acknowledgement of sources; citations; cite; verifiability; creative commons; export; Harvard; reference lists; literature references; paraphrasing; plagiarism; references; Vancouver;
			Copyright	open access; copyright; creative commons; plagiarism; intellectual property;
			Privacy-sensitive information	images; personal data;
		Synthesis or creation of new information		Abstracts; Articles; boooks; copyright; creative commons; objectivity; paraphrasing; plagiarism; summaries; synthetise; videos; creation; co-creation; formats; media; critical thinking; creative thinking; self-regulation; self-reflection;
	Publish and communicate	Publication of product		Altmetrics; open access; articles; boooks; copyright; creative commons; peer review; plagiarism, dissertations; theses; publications; video's; delen; Open Educational Resources; OER;
		Communication of product		Communication; participation; social skills; cultural skills; weblogs; wikis; videso; podcasts; images; social media; Research Gate; Academia; linkedin; Twitter;
		Valorisation of findings (outreach)		Communication; participation; media formats; social skills; cultural skills; weblogs; wikis; videso; podcasts; social media; Research Gate; Academia; Facebook; instagram; pinterest; linkedin; Twitter; visualization;

Figure 4: Keyword examples of the Information Lliteracy taxonomy (Van der Meer / Post, 2020)

Feedback and questions

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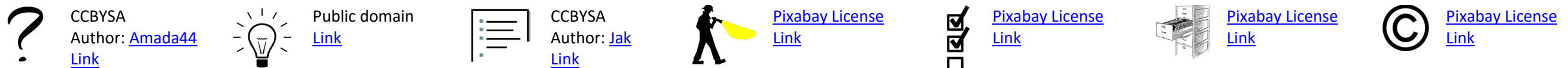
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